PB88-159934

Superfund Record of Decision (EPA Region 2) Williams Property Site, Middle Township Cape May, New Jersey, (First Remedial Action) September 1987

(U.S.) Environmental Protection Agency
Washington, DC

29 Sep 87

U.S. Department of Commerce
National Technical Information Service
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EPA/ROD/R02-87/044
September 1987

PB88-159934

EPA

Superfund Record of Decision:

Williams Property, NJ

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

The Williams Property site, a 5.6-acre tract of land containing a single residence, is located in Middle Township, Cape May County, New Jersey. The site is wooded and surrounded by land zoned for agricultural and residential use. In 1979, approximately 150 drums of liquid chemical wastes and sludge were emptied on the Williams Property. The New Jersey Department of Environmental Protection (NJDEP) investigated to determine the nature and extent of the contamination and the impact of the spill on the environment, particularly the ground water. The results indicated extensive contamination of surficial sludge, contamination of soil and ground water with heavy metals and a wide variety of organic chemicals. In June 1980, NJDEP removed approximately 1,200 yd^3 of sludge and soil. Continued evidence of ground water contaminants forced the closing of the Williams' well in 1984. It was subsequently discovered that widespread dumping of refuse and construction debris had occurred on the site for years. This dumping may have contributed to ground water contamination. Primary contaminants of concern include: bis (2-ethylhexyl) phthalate, PCE, methylene chloride and xylene.

The selected remedial action for the site includes: extraction and treatment of contaminated ground water with discharge to the underlying aquifer; excavation (700 yd^3) and offsite incineration of contaminated soil; regrading, backfilling (clean

(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Williams Property, NJ First Remedial Action - Final Contaminated Media: gw, soil Key contaminants: PCE, VOCs, xylene		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
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	None	

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EPA/ROD/R02-87/044
Williams Property, NJ
First Remedial Action - Final

16. ABSTRACT (continued)

soil) and revegetation; and provision of an alternate water supply to nearby residents with contaminated wells. The estimated capital cost of the remedial action is $513,750 with annual O&M of $64,600.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DATE: September 16, 1987

SUBJECT: Record of Decision for Williams Property

FROM: Stephen D. Luftig, Director
Emergency & Remedial Response Division

Stephen D. Luftig

TO: Christopher J. Daggett
Regional Administrator

Attached for your approval is the Record of Decision (ROD) for the Williams Property site in Middle Township, New Jersey.

The selected remedy for the site includes the excavation and incineration of contaminated soils, and the pumping and treatment of contaminated ground water. A surface cleanup by the New Jersey Department of Environmental Protection in 1980 removed most of the visibly contaminated materials. The total cost to complete the cleanup is estimated at $1 million.

A public meeting to discuss the recommended alternative was held on August 18, 1987. The public was in agreement with the remedy and, further, urged that we move ahead promptly to implement the action.

The ROD has been reviewed by the appropriate program offices within Region II and the State of New Jersey, and their input and comments are reflected in this document. In addition, a letter from Commissioner Dewling of the Department of Environmental Protection concurring with the selected remedy is attached.

If you have any questions, I will be happy to discuss them at your convenience.

Attachments

DECLARATION STATEMENT

RECORD OF DECISION

Williams Property

Site Name and Location

Williams Property, Middle Township, Cape May, New Jersey

STATEMENT OF PURPOSE

This decision document presents the selected remedial action for the Williams Property site, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, November 20, 1985.

STATEMENT OF BASIS

I am basing my decision primarily on the following documents, which are contained in the administrative record and characterize the area and evaluate the relative merits of remedial alternatives for the Williams Property site:

- Remedial Investigation Report, Williams Property, prepared by Woodward-Clyde Consultants, April 1987
- Final Draft Feasibility Study Report, Williams Property, prepared by Woodward-Clyde Consultants, July 1987
- Proposed Remedial Action Plan for the Williams Property site, August 1987
- The attached Decision Summary for the Williams Property site
- The attached Responsiveness Summary for the site, which incorporates public comments received
- Staff sumaries and recommendations

DESCRIPTION OF SELECTED REMEDY

Ground Water

- Extraction of contaminated ground water from the underlying aquifer

- Treatment of the extracted ground water by air stripping and carbon adsorption to remove volatile and semi-volatile organic contaminants

- Recharge (discharge) of the treated ground water to the underlying aquifer

Soils

- Excavation of the contaminated soils at the original spill area which are above action levels

- Removal of the excavated soils to an approved off-site disposal facility for incineration

- Regrading of the excavated area with clean fill, and revegetation and restoration of the site

Water Supply

- Provision of an alternate water supply to residents with individual wells impacted by the site

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, I have determined that the selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this action, and is cost-effective. Furthermore, this remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Finally, I have determined that this remedy utilizes permanent solutions and alternate treatment technologies to the maximum extent practicable.

The State of New Jersey has been consulted and agrees with the selected remedy, as is documented in the attached letter of concurrence.

I have also determined that the actions being taken at the Williams Property site are appropriate when balanced against the availability of Superfund monies for use at other sites.

September 29, 1987
Date

Christopher J. Daggett
Regional Administrator

DECISION SUMMARY

Williams Property Site

New Jersey

SITE LOCATION AND DESCRIPTION

The Williams Property site is a 5.6 acre tract of wooded land containing a single residence. The site is located in Middle Township, Cape May County, New Jersey (see Figure 1).

The area surrounding the site is zoned for agricultural and residential use. Immediately to the northwest and southeast of the site is residential property. This area is ringed to the northwest, southwest and southeast by gravel pits, some of which contain water for at least part of the year. Further away, to the east and southeast are saltwater marshes, then inland waterways and major coastal communities. The Timber Beaver Swamp fish and wildlife management area is located less than three miles northwest of the site.

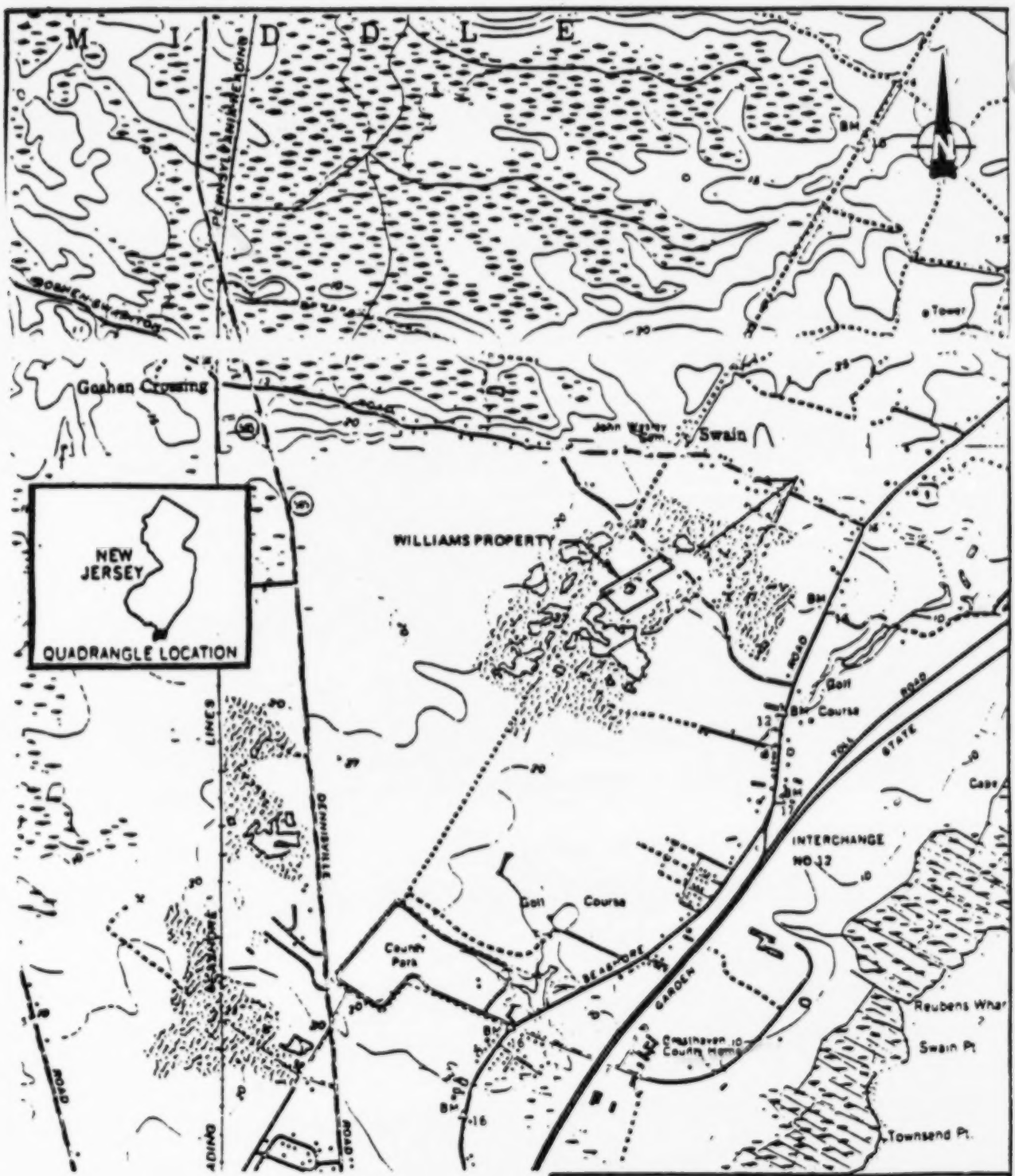
The Williams Property is located in the Atlantic Coastal Plains Physiographic Provence. It is situated on an outcrop of the Holly Beach Aquifer. The Holly Beach is an unconfined, unconsolidated aquifer of Recent age, composed primarily of coarse to fine-grained sand with varying amounts of gravel, known as the Cape May Formation. This formation is approximately 60 feet thick at the site.

Underlying the Holly Beach Aquifer is the Cohansey Aquifer. The Cohansey Aquifer consists of coarse to fine-grained sand with traces of gravel. This formation is at least 30 feet thick at the Williams Property.

The two aquifers are separated by an intervening clay layer with some traces of silt intermixed. This clay lens is typically fifteen to thirty-five feet thick in this area.

Ground water movement in the Holly Beach Aquifer is to the east-northeast. The movement of ground water in the Cohansey Aquifer is to the southwest, almost directly opposite to the Holly Beach. This indicates that the intervening clay layer has formed an effective barrier between the two aquifers.

The nearest surface water occurs about 700 feet southeast and 700 northwest of Williams Property in the form of water-filled sand and gravel pits. Natural surface streams are not located in the immediate vicinity of the site. The nearest stream is Deep Creek, which is approximately 3,100 feet southeast of the site.



SOURCES: USGS WOODBINE, N.J. QUADRANGLE AND THE STONE HARBOR, N.J. QUADRANGLE, (1958,1955)

SITE LOCATION MAP
WILLIAMS PROPERTY SITE

WOODWARD—CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR BY: RJM	SCALE 1" = 2000'	PROJ NO 84P4007C
CK'D BY: LEW		FIG NO 1

SITE HISTORY

In August 1979, approximately 150 drums of liquid chemical wastes and sludge were emptied on the Williams Property, adjacent to the Williams residence.

In response to the release of chemicals, the New Jersey Department of Environmental Protection (NJDEP) undertook extensive investigations to determine the impact of the spill on the environment and, in particular, on the ground water. These investigations revealed that a wide variety of organic chemicals and several metals were present in the surficial sludge, the underlying soil, and the ground water beneath the site. Sampling and analysis of domestic ground water supplies by NJDEP beginning in November 1979 indicated contamination by organic chemicals up to a total concentration of 91 micrograms/liter (ug/l). As a result of these findings, NJDEP initiated an emergency cleanup of the spill site and removed approximately 1200 cubic yards of sludge and soil in June 1980. Prior to the cleanup, monitoring of domestic water supplies was halted due to a sharp decrease in contaminant concentrations, but monitoring of ground water continued. Monitoring of domestic water was resumed in 1982 due to concern over the long-term effects of the spill on local domestic water supplies. However, little or no evidence of contamination was found, except in the Williams' well where contamination increased sharply in 1984. The county health department closed the well, and the concentration of contaminants in it decreased abruptly around that time.

CURRENT SITE STATUS

Through a Cooperative Agreement with the Environmental Protection Agency (EPA), the NJDEP completed a remedial investigation and feasibility study (RI/FS) for the Williams Property site in July 1987 utilizing the consulting firm of Woodward-Clyde Consultants (WCC). Contamination sources, contamination transport, environmental receptors impacted and suspected risks posed by contaminants were evaluated in the RI/FS. The following is a brief summary of the types and concentrations of contaminants detected at the site.

The remedial investigation (RI) revealed that a plume of organic contaminants is present in the ground water beneath the site. The plume emanates from the original spill area which contains limited residual contaminants in the soil. The plume extends directly down the hydraulic gradient to the east-northeast at least 600 feet from the source. Where it crosses beneath Siegtown Road, the plume is less than 300 feet wide. The total concentration of organic contaminants measured in that area (at Monitoring Well 85-7) is approximately 400 ug/l and appears to be increasing with time, whereas concentrations in upgradient wells appear to be decreasing. Most of the more soluble contaminants found in the plume appear absent in the soil at the spill site, whereas some of the less soluble contaminants remain.

Taken together with the measured hydraulic properties of the Holly Beach Aquifer, these data suggest that the plume is advancing at a rate of between 90 feet and 200 feet per year in the Holly Beach Aquifer. The data also indicate low level contamination of the Cohansey Aquifer beneath the Holly Beach Aquifer. Because this contamination was also found in upgradient wells in the Cohansey Aquifer, these contaminants cannot be attributed to the site. Table 1A presents the applicable or relevant and appropriate requirements for ground water and soils. Tables 1B through 1F present the RI sampling results for the potable wells, monitoring wells, and soil borings.

It was thought, at one time, that the 1979 spill may have been the cause of the domestic well contamination observed. However, WCC's hazardous substance inventory revealed that widespread refuse and construction debris dumping activity has been occurring for years across a large part of the Williams Property, opening up the possibility of other sources of soil and ground water contamination. The estimated extent of the plume and the hydraulic properties of the Holly Beach Aquifer indicated that the contamination of domestic wells along Siegtown Road, detected in 1979, is not likely to have originated at the spill site. At present, the only domestic well contamination that can be reasonably linked to the spill is that of the Williams' well itself, which is located in the center of the plume. The approximate extent of the contaminated ground water plume, which originated from the spill, along with the distribution of the contaminants in the ground water, are shown in Figure 2.

The municipal supply wells are located upgradient from the site. Since the plume of contaminated ground water is moving to the northeast, these municipal wells should not be affected by the site.

The residents along Siegtown Road, including the Williams' residence, have recently been provided with municipal water. The private wells at these homes are no longer in use.

Risk Assessment

To focus the public health risk assessment on the chemicals of greatest concern, a subset of indicator chemicals was determined based on the level and extent of contamination, human toxicity, and the ability to migrate or persist in the environment. This was conducted in accordance with the EPA Public Health Evaluation Manual.

For each of the chemicals detected at or near the Williams Property site, its ranking in the EPA priority groups was recorded. Maximum concentrations of contaminants and frequency of occurrence in water samples and soil were reviewed to assist in screening contaminants. Following this initial screening, the properties of the chemicals were reviewed to

TABLE 1A APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS:

Substances[q]	MCLG[a] (ug/l)	MCL[b] (ug/l)	NJ Interim GW Cleanup Criteria (ug/l)	NJ Drinking Water MCL (ug/l)	NJ GW Quality Standards (ug/l)	Health[c] Advisories (ug/l)	AWQC-Org only[d] (ug/l)	TCLP[e] (mg/l)	Soil Cleanup[f] (ug/kg)
Organics[p]									
Methylene chloride			5(p)	2		50[k]	0(0.19)	8.6	1,000[n]
Acetone[o]									1,000
DEHP[m]			5(p)(r)				21,000		10,000
1,1,1-Trichloroethane	200	200[g]		26		22[k]	19,000	30	
Trichloroethene	0	5[g]	5(p)	1		2.8[k]	0 (2.8)	0.07	
Tetrachloroethene	(u)		5(p)	1		0.7[k]	0 (.88)	0.1	1,000
Total xylene	440[g]			44		2,200			1,000
Toluene	2,000[g]		(p)			10,100	15,000	14.4	1,000
1,1-Dichloroethene			(p)						1,000
Ethylbenzene	680[g]		(p)			3,400	2,400		
Bis(2-chloroethyl)ether							0 (.03)	0.05	
Isophorone							5,200		
2-Methylphenol							400[k]		
2-Butanone (MEK) [o]						860		7.2	
4-Methyl-2-pentanone (MIBK) [o]									
Benzoic acid									
Benzyl alcohol									
4-Methylphenol									
Chloroform		100[l]	5(p)				0 (0.19)	0.07	
Naphthalene									10,000
2-Methylnaphthalene							454,000		
Diethylphthlate							44,000		10,000
Di-n-butyl phthalate									10,000
Di-n-octyl phthalate							5,500	14.4	10,000
Phenols							188	1.4	
Chlorobenzene	60[g]		(p)	4		3,150,			

TABLE 1A APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

(continued)

Substances[g]	MCLG[a] (ug/l)	MCL[b] (ug/l)	NJ Interim GW Cleanup Criteria (ug/l)	NJ Drinking Water MCL (ug/l)	NJ GW Quality Standards (ug/l)	Health[c] Advisories (ug/l)	AWQC-GW only[d] (ug/l)	EP Tox[f] (mg/l)	Soil7 Cleanup[f] (mg/kg)
Metals									
Aluminum									
Antimony							146		
Arsenic	50[g]	50[f]			50	50	0 (25 ng/l)	5.0	20
Barium	1,500[g]	1,000[f]			1,000	1,800		100.0	400
Beryllium							0 (3.9 ng/l)		
Cadmium	5[g]	10[f]			10	18	10	1.0	3
Calcium									
Chromium	120[g]	50[f]			50	170	50[f]	5.0	100
Cobalt									
Copper	1,300[g]				1,000[s]		1,000[h]		170
Iron					500[s]				
Lead	20[g]	50[f]			50	0.31[k]	50	5.0	100
Magnesium									
Manganese					50[s]				
Mercury	5[g]	2[f]			2	5.5	10	0.2	1
Nickel						350	15.4		
Potassium									
Silver		50[f]			50		50	5.0	5
Sodium					50,000[s]				
Tin									
Vanadium									
Zinc					5,000[s]		5,000[h]		350
Other									
Cyanide					200	750	200,000		12

TABLE 1A APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
(continued)

NOTES:

a. Maximum Contaminant Level Goal.
b. Maximum Contaminant Level.
c. EPA drinking water health advisories, based on life time exposure.
d. Ambient Water Quality Criteria adjusted for drinking water only.
e. Toxic Characteristic Leaching Procedure.
f. New Jersey soil cleanup criteria for ECRA sites.
g. Proposed value.
h. Organoleptic, standard set based on taste or odor.
i. Interim MCL.
j. Parenthesized value corresponds to a 10^{-6} increased lifetime cover risk.
k. Reference concentrations for potential carcinogens, corresponds to a potential cancer.
l. Value of Chromium(+6).
m. Di(ethylhexyl)phthlate or Bis(2-ethylhexyl)phthlate.
n. Value less than detection limit.
o. The New Jersey soil cleanup action level for volatile organics is 1 mg/kg and for base neutral extractables is 10 mg/kg.
p. Safe drinking water exposure levels for ketones developed at EPA's ECAO in Cincinnati: MEK (1750 ppb), acetone (3500 ppb), and MIBK (1750 ppb)
q. On an interim basis, the corrective action criteria for groundwater of 50 ppb apply to the sum of compounds noted.
r. Tentatively identified nonpriority pollutants were not included as guidelines are not available.
s. DEHP is included per input by NJDEP.
t. Secondary standard.
v. Extraction Procedure Toxicity Characteristic.
u. An MCLG was proposed but subsequently withdrawn, a new MCLG currently under discussion (USEPA, ODW, 1987).
v. Data from RI sampling only.

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Table 1B
POTABLE WELL WATER SAMPLE ANALYSES
ROUND 1

	COMPUCHEM	83463	83466	83469	83472	83444	83475	83478	83481	83484	88178	88168	88172	88175
	SAMPLE NUMBERS	83464	83467	83470	83473	83457	83476	83479	83482	83485	88179	88161	88173	88176
		83465	83468	83471	83474	83458	83477	83480	83483	83486	88180	88162	88174	88177
	UCC SAMPLE NUMBER	13669	13670	13671	13672	DUP 1	13676	13677	Field	Trip	13674	13675	FBW-529	TRBL-32530
	SAMPLING DATE	4/24/86	4/24/86	4/24/86	4/24/86	4/24/86	4/24/86	4/24/86	4/24/86	4/24/86	5/29/86	5/29/86	5/29/86	5/29/86
COMPOUNDS	UNITS	SAMPLE LOCATION	Thompson Residence	Reid Residence	Davis Residence	Phelps Residence	Phelps Residence	Duncan Residence	Lewis Residence	Field Blank	Trip Blank	Polish Amer Club	Williams Residence	Field Blank	Trip Blank
Methylene Chloride	ppm		2.9+	*	*	*	2+	*	*	2.0(b)+	4.0(b)+	*	*	10	*
Acetone	ppm		5.3(b)+	*	4.7(b)+	3.0(b)+	*	3.8+	4.4(b)+	4.3(b)+	*	*	*	*	*
bis (2-ethylhexyl) phthalate	ppm		*	*	*	*	*	*	*	*	*	*	28	*	*
Chloroform	ppm		*	*	*	(1.9)	(2.0)	*	*	*	*	*	*	*	*
Aluminum	ppb		850	200	(190)	390	270	(170)	*	(120)	(120)	(61)E	2310E	(52)E	(53)E
Barium	ppb		(40)	*	*	(80)	(70)	*	*	*	*	(29)E	(29)E	*	*
Cadmium	ppb		*	*	*	*	*	*	*	*	*	(4.3)	*	*	*
Calcium	ppb		7130	(2660)	5140	(4560)	(2940)	6800	(3910)	(1050)	(1140)	(3520)E	(4420)E	(100)E	(69)E
Chromium	ppb		*	*	*	*	*	*	*	*	*	(4.5)E	76E	(2.3)E	(2.5)E
Cobalt	ppb		*	*	*	*	*	*	*	*	*	(5.6)E	(49)E	*	*
Copper	ppb		40	50	60	120	80	260	250	*	*	66E	286E	(8.0)E	(12)E
Iron	ppb		52400R	750R	24000	8600R	18200	27000	13000	77000	11000	3170E	256000E	7950E	(50)E
Lead	ppb		6.5BR	13BR	12BR	8.9BR	7BR	17BR	9.7BR	14BR	10BR	70	28800	5B	(2.8)B
Magnesium	ppb		6900	(1070)	(2200)	(4700)	(4690)	(2250)	(2300)	*	*	(3330)E	(750)E	*	*
Manganese	ppb		180	20B	(10)	(10)	(10)	5B	(10)	*	*	45E	386E	(3.3)E	*
Mercury	ppb		*	*	*	*	*	*	*	*	*	*	0.87	*	*
Nickel	ppb		*	*	*	*	*	*	*	5B	*	(21)E	110E	*	(13)E
Potassium	ppb		*	*	*	(1000)	(1600)	*	*	*	*	(1000)	*	*	*
Silver	ppb		20B	20B	*	*	*	*	*	*	*	*	*	*	*
Sodium	ppb		9500	7900	9700	26600	25600	13300	6200	(2200)	(1000)	6470	(3690)	*	*
Tin	ppb		(12)R	*	(11)R	*	(12)R	*	*	*	*	*	*	*	*
Vanadium	ppb		*	*	*	*	*	*	*	*	*	(2.6)	(60)	*	*
Zinc	ppb		16BR	90BR	60BR	180BR	70BR	60BR	80BR	30BR	50BR	2330BE	17200BE	38BE	41BE
Cyanide	ppb		*	*	*	*	(1R	*	*	*	*	*	*	13.5B	*
Phenols	ppm		*	*	*	*	*	*	*	*	*	*	27	*	*

Notes:

* Below Method Detection Limit.
( ) Value less than detection limit specified in lab contract.
(b) Compound also appeared in analysis of laboratory method blank; not attributed to ground water contamination.
B Indicates duplicate analysis is not within control limits.
R Indicates spike sample recovery is not within control limits.
E Indicates a value estimated or not reported due to the presence of interference.
+ Not attributed to ground water contamination; see text.

Table 1C
POTABLE WELL WATER SAMPLE ANALYSES
ROUND 2

	COMPUCHEM	97728	97734	97712	97748	97741	97708	97683	97751	97686	97689	97738
	SAMPLE NUMBERS	97730	97735	97714	97749	97742	97703	97684	97752	97687	97695	97739
		97732	97736	97722	97750	97744	97707	97685	97753	97688	97697	97740
	UCC SAMPLE NUMBER	WP-22	WP-1	WP-35	WP-4	WP-27	WP-28	WP-25	WP-17	WP-15	WP-12	WP-26
	SAMPLING DATE	8/21/86	8/21/86	8/21/86	8/21/86	8/21/86	8/21/86	8/21/86	8/21/86	8/21/86	8/21/86	8/21/86
COMPOUNDS	SAMPLE LOCATION / SAMPLE DEPTH (FEET) / UNITS	Thompson Residence	Reid Residence	Davis Residence	Phelps Residence	Duncan Residence	Lewis Residence	Polish Amer Club	Polish Amer Club	Williams Residence	Field Blank	Trip Blank
Methylene Chloride	ppb	0	(4.1)+	0	(1.9)+	(3.4)+	(3.2)+	(2.8)+	5.1+	0	13	(4.4)
Acetone	ppb	0	(7.8)+	(4.7)(b)+	0	0	0	0	0	538(b)+	(6.6)	0
bis (2-ethylhexyl) phthalate	ppb	0	0	0	0	0	0	0	0	(3.2)	0	0
Di-n-butylphthalate	ppb	0	0	0	0	(2.2)	0	(2.2)	0	0	0	0
Benzyl Alcohol	ppb	0	0	0	0	0	0	0	0	(2.6)	0	0
4-Methylphenol	ppb	0	0	0	0	0	0	0	0	48	0	0
Benzoic Acid	ppb	0	0	0	0	0	0	0	0	(5.2)	0	0
Chloroform	ppb	0	0	0	(1.9)	0	0	0	0	0	0	0
Aluminum	ppm	512	(27)	(35)	(39)	(55)	(64)	(2910)	(21)	38000	3240	0
Antimony	ppm	0	0	0	0	0	0	0	0	0	(32)	0
Barium	ppm	(34)	(4.4)	(23)	(94)	(16)	(35)	(28)	(28)	(45)	(2.1)	(0.7)
Beryllium	ppm	0	0	0	0	0	0	0	0	(1.8)	0	0
Cadmium	ppm	0	0	0	0	0	0	0	5.8	33	0	0
Calcium	ppm	6670	(1630)	(4100)	(2120)	5430	(2980)	(3510)	(3360)	(3810)	(84)	0
Chromium	ppm	0	0	0	0	0	0	0	0	32E	12E	0
Cobalt	ppm	(13)	0	0	0	0	0	0	(3.1)	(21)	0	0
Copper	ppm	(24)	(9.7)	67	92	175	145	0	(19)	355	0	0
Iron	ppm	3710E	742E	215E	1950E	381E	187E	486	376E	288000	481	(12)E
Lead	ppm	(4.3)	(4.3)N	145N	(4.3)N	175N	0	(4.3)N	7.5N	2010N	(3.7)N	(4.4)SN
Magnesium	ppm	6120	(1050)	(1000)	(4540)	(1820)	(2830)	(3400)E	(3350)	(1720)E	(760)E	(153)
Manganese	ppm	178E	22E	(7.5)E	24E	39E	(14)E	45	48E	285	0	0
Mercury	ppm	0	0	0	0	0	0	0	0	1.3	0	0
Nickel	ppm	0	0	0	0	0	0	0	0	68	0	0
Potassium	ppm	(1340)	0	0	(1060)	0	0	(2400)	(2240)	(1260)	0	0
Sodium	ppm	8650	7870	10400	25300	11000	(4140)	5890	5730	0	0	(1070)
Zinc	ppm	250	68	43	57	44	61	2810	2520	38000	22	27
Phenols	ppb	0	0	0	0	0	84+	0	0	29+	0	60

Notes:
0 Below Method Detection Limit.
( ) Value less than detection limit specified in lab contract.
(b) Compound also appeared in analysis of laboratory method blank; not attributed to ground water contamination.
E Indicates a value estimated or not reported due to the presence of interference.
S Indicates value determined by Method of Standard Addition.
N Indicates spike sample recovery is not within control limits
+ Not attributed to groundwater contamination; see text.

Table 1D

MONITORING WELL WATER SAMPLE ANALYSES

ROUND 1

COMPUCHEM		90844	90867	90828	90861	90850	90858	90855	90847	91865	90841	90864	91868	91865	91853	91858	91862	91870	91833	91871
SAMPLE NUMBERS		90845	90868	90835	90862	90851	90859	90856	90848	91866	90842	90865	91869	91857	91854	91851	91863	91868	91843	91872
		90846	90869	90848	90863	90852	90860	90857	90849	91867	90843	90866	91870	91858	91855	91852	91864	91861	91845	
MCC SAMPLE NUMBER		MW-85-1C	MW-85-1A	MW-85-1B	MW-85-4	MW-85-5	A	MW-85-6	MW-85-8B	MW-85-7	B	C	MW-85-3A	MW-85-3B	MW-85-9A	MW-85-9B	MW-85-2A	MW-85-8A	E	D
SAMPLING DATE		6/19/86	6/19/86	6/19/86	6/19/86	6/19/86	6/19/86	6/19/86	6/19/86	6/19/86	6/19/86 Field Blank	6/19/86 Trip Blank	6/20/86	6/20/86	6/20/86	6/20/86	6/20/86	6/20/86	6/20/86 Field Blank	6/20/86 Trip Blank
SAMPLE LOCATION		MW-85-1C	MW-85-1A	MW-85-1B	MW-85-4	MW-85-5	MW-85-5	MW-85-6	MW-85-8B	MW-85-7			MW-85-3A	MW-85-3B	MW-85-9A	MW-85-9B	MW-85-2A	MW-85-8A		
COMPOUND	UNITS																			
Methylene Chloride	ppm	6.1+	+	+	+	+	+	+	+	+	6.6+	+	+	+	(1.9)(b)	(4.3)(b)	10+	(1.5)(b)	(4.9)(b)	21
Acetone	ppm	14(b)	(6.4)(b)	8+	+	(6.1)(b)	6.8(b)	(5.1)+	(5.7)+	72(b)+	(6.2)(b)	(5.4)(b)	(6.0)(b)	(7.7)(b)	(7.4)(b)	(7.6)(b)	(6.9)(b)	12(b)	(9.9)(b)	14(b)
bis (2-ethylhexyl) phthalate	ppm	+	(6.2)(b)	(3.6)	6.6(b)	(2.8)	+	+	(3.2)	(3.6)	+	(3.0)(b)	(6.2)	(4.0)	1000	+	+	+	+	+
1,1 Dichloroethane	ppm	+	+	+	+	(4.0)	(3.9)	+	+	+	+	+	+	+	+	+	+	+	+	+
1,1,1 Trichloroethane	ppm	+	+	7.4	+	48	50	+	+	+	+	+	+	+	+	+	+	+	+	+
Trichloroethene	ppm	+	+	+	+	7.8	8.2	+	+	+	+	+	+	+	+	+	+	+	+	+
Tetrachloroethene	ppm	+	+	7.0	+	100	100	+	+	+	+	+	+	+	+	+	+	+	+	+
Total Xylenes	ppm	+	+	+	+	210	260	+	+	6.3	+	+	+	+	+	+	+	+	+	+
Toluene	ppm	+	+	+	+	+	(2.9)+	+	+	+	+	+	+	+	+	+	+	(2.2)	+	(2.1)
Ethyl Benzene	ppm	+	+	+	+	+	(1.5)+	+	+	+	+	+	+	+	+	+	+	+	+	6.3
bis(2-Chloroethyl) ether	ppm	+	+	+	+	(3.8)	(3.2)	+	+	20	+	+	+	+	+	(4.0)	+	(4.0)	+	+
2-Methylphenol	ppm	+	+	+	+	(2.2)	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Isophorone	ppm	+	+	+	+	(5.4)	+	+	+	150	+	+	+	+	+	+	+	+	+	+
2-Butanone	ppm	+	+	+	+	+	+	+	+	16	+	+	+	+	+	+	+	+	+	+
4-Methyl - 2-pentanone	ppm	+	+	+	+	+	+	+	+	59	+	+	+	+	+	+	+	+	+	+
Aluminum	ppb	(71)	2090	201	4150	11500	8470	8740	2550	7210	(134)	(53)	7604	4500	7460	12000	14900	6790E	(3330)	(1570)
Arsenic	ppb	+	+	+	+	(9.1)8	(5.2)8	(7.0)8	+	+	+	+	+	+	+	+	+	(4.3)	+	+
Barium	ppb	(5.9)	(65)	(49)	(119)	265	227	(139)	(60)	(27)	(29)	(27)	(13)	(16)	(20)	(25)	(46)	(47)	(3.6)	+
Beryllium	ppb	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	(1.6)	(1.8)	(1.6)
Cadmium	ppb	+	+	6.4	+	5.7	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Calcium	ppb	14100	5050	24100	8270	5220	5640	14000	10000	7910	(1220)	+	16200	13100	5400	11300	6820	21300	(866)	(119)
Chromium	ppb	(8.4)	(7.6)	(6.3)	+	36	15	29	15	17	(7.7)	+	19	15	16	(9.9)	20	18E	(4.7)	17
Cobalt	ppb	(10)	(4.1)	(15)	+	(10)	+	(16)	(12)	(25)	(8.3)	+	(12)	(11)	(12)	(5.1)	(16)	(13)E	+	(12)
Copper	ppb	(15)	38	(15)	55	76	72	61	30	37	30	(4.9)	37	25	30	30	37	37E	(21.6)	(21)
Iron	ppb	206	313	6760	3360	(57)	11000	14200	7720	72000	101	(36)	23400	10900	19300	22000	42200	14000	(4410	(2430
Lead	ppb	(4.3)	185	(2.7)	395	29	24	+ 38	(3.4)	125	10	12	9.5	7.1	5.9	(3.6)	235	+ 6.6	19	7.4
Magnesium	ppb	(1390)	(1860)	6850	(1530)	(2970)	(2530)	(3300)	5140	(2960)	(133)	+	(1760)	(1200)	(1730)	(1990)	2490	(704)E	+	(56)
Manganese	ppb	65	187	404	174	341	287	489	329	348	(5.9)	(1.6)	67	67	121	85	167	(48)	(2.4)	(2.2)
Mercury	ppb	(0.14)	(0.14)	+	(0.18)	+	+	+	0.2	(0.1818	(0.14)	(0.38)	(0.1818	0.240	(0.1418	+	+	+	(0.1418	(0.1418
Nickel	ppb	(21)	(21)	42	(27)	57	(33)	59	(37)	(3918	(15)	+	(2718	(3218	(1718	(2418	(3718	(191#	+	(15)
Potassium	ppb	+	+	(2200)	(2900)	(1700)	(1500)	(1500)	(1200)	+	+	+	+	(4500)	+	6800	+	46200	+	+
Silver	ppb	100	+	100	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10
Sodium	ppb	10600	(4000)	33600	59100	75000	77000	64300	47900	16000	(2890)	8500	15900	13100	14600	29600	20000	64000E	+	(2370)
Tin	ppb	+	+	+	+	+	+	+	+	+	+	28	+	+	+	+	+	+	+	+
Vanadium	ppb	+	+	+	+	+	+	+	+	(17)	+	+	+	+	+	+	+	(30)E	+	+
Zinc	ppb	23	39	75	5	85	80	94	30	550	52	+	290	290	43	340	370	380E	300	(110
Cyanide	ppb	+	+	+	+	+	+	+	+	116+	+	+	74+	+	101+	4520+	146+	84+	6160	+
Phenols	ppm	+	+	34+	+	51+	42+	+	23+	48+	25+	+	12+	12+	48+	23+	42+	160+	73	—

Notes:

+ Below Method Detection Limit.

( ) Value less than detection limit specified in lab contract.

(b) Compound also appeared in analysis of laboratory method blank; not attributed to ground water contamination.

@ Indicates duplicate analysis is not within control limits.

E Indicates a value estimated or not reported due to the presence of interference.

S Indicates value determined by Method of Standard Addition.

N Indicates spike sample recovery is not within control limits.

* Not attributed to ground water contamination; see text.

Table 1E

MONITORING WELL WATER SAMPLE ANALYSES

ROUND 2

	COMPUCHEM	97217	97234	97237	97249	97258	98064	98070	98077	98067	98068
	SAMPLE NUMBERS	97218	97235	97238	97253	97260	98065	98071	98078	98068	98081
		97233	97236	97239		97262	98066	98072	98079	98069	98082
	NCC SAMPLE NUMBER	MP-9	MP-7	MP-3	MP-23	MP-48	MP-19	MP-33	MP-28	MP-29	MP-39
	SAMPLING DATE	8/19/86	8/19/86	8/19/86	8/19/86 Field Blank	8/19/86 Trip Blank	8/22/86	8/22/86	8/22/86	8/22/86 Field Blank	8/22/86 Trip Blank
	SAMPLE LOCATION	MW-85-9B	MW-85-2A	MW-85-2B			MW-85-7	MW-85-7	MW-85-8A		
COMPOUNDS	UNITS										
Methylene Chloride	ppb	*	*	*	14+	(3.8)+	(4.7)+	5.1+	*	18(b)	(2.7)
Acetone	ppb	*	*	*	*	*	46(b)	38(b)	*	21(b)	*
bis (2-ethylhexyl) phthalate	ppb	(12)	(14)	(4.6)	*	*	*	(4.0)	(7.6)	*	*
1,1,1 Trichloroethane	ppb	*	*	*	*	*	*	*	*	*	*
Trichloroethene	ppb	*	*	*	*	*	(2.0)	*	*	*	*
Tetrachloroethene	ppb	*	*	*	*	*	*	(1.3)	*	*	*
Total Xylenes	ppb	*	*	*	*	*	22	22	*	*	*
Toluene	ppb	*	*	*	(1.4)	*	*	*	*	*	*
Ethyl Benzene	ppb	*	*	*	(3.8)	*	(3.8)	(3.3)	*	*	*
bis(2-Chloroethyl) ether	ppb	*	*	*	*	*	21	22	*	*	*
Isophorone	ppb	*	*	*	*	*	250+	280+	*	230	*
2-Butanone	ppb	*	*	*	*	*	34	19	*	*	*
4-Methyl - 2-pentanone	ppb	*	*	*	*	*	72	66	*	*	*
2,4-Dinitrotoluene	ppb	*	*	*	*	*	*	*	*	*	*
4-Nitrophenol	ppb	*	*	*	*	(20)	*	*	*	*	*
N-nitrosodiphenylamine	ppb	*	*	*	*	(2.2)	*	*	*	*	*
Di-n-butylphthalate	ppb	*	*	*	*	(3.4)	*	*	*	*	*
Aluminum	ppm	2610	8250	2510	(120)	(120)	474	473	1660	(39)	*
Barium	ppm	(22)	(38)	(24)	(1.2)	(1.0)	(28)	(28)	(17)	(1.9)	*
Cadmium	ppm	5.1	6.5	*	*	*	(3.5)	7.3	10	*	*
Calcium	ppm	9970	(4250)	13100	(79)	(70)	6290	6350	6500	(156)	(41)
Chromium	ppm	*	*	*	*	*	*	*	(9.5)	*	*
Cobalt	ppm	*	*	*	*	*	(9.9)	(12)	(4.1)	*	*
Copper	ppm	(13)	*	*	*	*	27	(14)	46	(9.2)	*
Iron	ppm	651	1930	1030	*	*	5610E	5700E	2900E	*	*
Lead	ppm	(3.7)N	(2.4)N	(3.2)N	(3.4)N	*	(1.5)N	(1.8)	105N	7N	(3.0)N
Magnesium	ppm	(2010)E	(2180)E	(2080)E	*	*	(2950)	(3100)	1470	*	(139)
Manganese	ppm	45	112	53	*	*	238E	241E	56E	*	*
Mercury	ppm	*	*	*	*	*	*	*	0.24	*	*
Potassium	ppm	8430	(2190)	9550	*	*	(1820)	(1840)	(1290)	*	*
Sodium	ppm	14600	10100	12000	*	*	8120	8620	5680	*	(1060)
Vanadium	ppm	(2.4)	*	2	*	*	*	(2.3)	(3.7)	*	*
Zinc	ppm	42	34	27	31	24	69	68	81	31	(18)
Phenols	ppb	13	*	10+	*	33+	*	*	43+	33	51

Notes:

* Below Method Detection Limit.

( ) Value less than detection limit specified in lab contract.

(b) Compound also appeared in analysis of laboratory method blank; not attributed to ground water contamination.

E Indicates a value estimated or not reported due to the presence of interference.

S Indicates value determined by Method of Standard Addition.

N Indicates spike sample recovery is not within control limits.

D Indicates duplicate analysis is not within control limits.

\+ Not attributed to ground water contamination; see text.

Table 1E (cont.)
MONITORING WELL WATER SAMPLE ANALYSES
ROUND 2

	COMPUCHEM	97542	97587	97496	98854	97522	97493	97499	97582	97516	97510	97519	97513
	SAMPLE NUMBERS	97544	97588	97497	98855	97523	97494	97500	97583	97517	97511	97520	97514
		97545	97589	97498	98856	97525	97495	97501	97586	97518	97512	97521	97515
	WCC SAMPLE NUMBER	MP-18	MP-5	MP-13	MP-36	MP-11	MP-21	MP-14	MP-31	MP-10	MP-8	MP-37	MP-32
	SAMPLING DATE	8/20/86	8/20/86	8/20/86	8/20/86	8/20/86	8/20/86	8/20/86	8/20/86	8/20/86	8/20/86	8/20/86	8/20/86
COMPOUND	SAMPLE LOCATION / UNITS	MW-85-1C	MW-85-1A	MW-85-1B	MW-85-3A	MW-85-3B	MW-85-4	MW-85-5	MW-85-6	MW-85-8B	MW-85-9A	Field Blank	Trip Blank
Methylene Chloride	ppb	*	*	*	*	*	*	*	*	*	*	18	*
Acetone	ppb	*	*	*	*	*	*	*	*	*	*	*	*
bis (2-ethylhexyl) phthalate	ppb	[2.2]	*	[4.4]	[2.2]	26	[1.4]	*	*	20	[8.4]	*	*
1,1,1 Trichloroethane	ppb	*	*	*	*	*	[4.2]	29	*	*	*	*	*
Trichloroethene	ppb	*	*	*	*	*	*	7	*	*	*	*	*
Tetrachloroethene	ppb	*	[2.8]	*	*	*	*	73	*	*	*	*	*
Total Xylenes	ppb	*	*	*	*	*	*	65	*	*	*	*	*
Toluene	ppb	*	*	*	*	*	*	*	*	*	*	*	*
Ethyl Benzene	ppb	*	*	*	*	*	*	*	*	*	*	*	*
bis(2-Chloroethyl) ether	ppb	*	*	*	*	*	*	*	*	*	*	*	*
Isophorone	ppb	*	*	*	*	*	*	*	*	*	*	*	*
2-Butanone	ppb	*	*	*	*	*	*	*	*	*	*	*	*
4-Methyl - 2-pentanone	ppb	*	*	*	*	*	*	*	*	*	*	*	*
2,4-Dinitrotoluene	ppb	*	*	*	*	*	*	*	*	*	*	*	[2.8]
4-Nitrophenol	ppb	*	*	*	*	*	*	*	*	*	*		*
N-nitrosodiphenylamine	ppb	*	*	*	*	*	*	*	*	*	*		*
Di-n-butylphthalate	ppb	*	*	*	*	*	*	*	*	*	[2.2]	*	*
1,4-Dichlorobenzene	ppb	*	*	*	*	*	*	*	*	*	*	*	*
1,2,4-Trichlorobenzene	ppb	*	*	*	*	*	*	*	*	*	*	*	*
1,2-Dichlorobenzene	ppb	*	*	*	*	*	*	*	*	*	*	*	*
Benzoic Acid	ppb	*	*	*	*	*	*	*	*	*	*	*	*
Aluminum	ppm	[353]	9840	704	856	227	104000	161000	58700	2060	7560	*	[13]
Arsenic	ppm	*	[6.3]N	[3.0]N	*	*	[3.7]N	125N+	[3.6]N	*	*	*	
Barium	ppm	[5.9]	[150]	[68]	[11]	[27]	[197]	377	[91]	[44]	[20]	[8.5B]	[8.1]
Cadmium	ppm	*	*	*	*	*	*	*	*	[3.0]	*	*	*
Calcium	ppm	13500	12200	31400	14000	*	6300	10900	12200	14700	[4550]	[84]	[31]
Chromium	ppm	*	27E	*	*	*	28E	36E	13E	*	*	*	*
Cobalt	ppm	*	[6.5]	[11]	*	*	[4.5]	[8.8]	*	*	*	*	*
Copper	ppm	*	69	[19]	[9.2]	*	38	42	[23]	[6.0]	*	*	*
Iron	ppm	222	16900	9480	1440E	788	10800	19100	8100	5750	2300	[16]	*
Lead	ppm	*	27N	[4.2]N	[1.8]N	[4.1]N	24N	48N	20N	[2.4]N	5.2N	[3.4]N	[1.6]N
Magnesium	ppm	1390E	[3440]E	9220E	[1540]	[1210]E	[2140]E	3750E	[2570]E	[4380]E	[1910]E	[144]E	*
Manganese	ppm	66	455	700	[55]E	44	266	406	282	226	120	*	*
Nickel	ppm	*	[27]	*	*	*	[29]	76	*	*	[21]	*	*
Potassium	ppm	[1600]	[2140]	5480	*	15400	[3610]	[3600]	[2930]	[2880]	[1520]	*	*
Sodium	ppm	9870	12300	28600	8810	22100	27700	32500	23300	36100	12900	[1040]	[966]
Vanadium	ppm	*	[15]	*	*	[4.4]	[11]	[14]	[6.6]	*	*	*	*
Zinc	ppm	68	169	125	43	37	179	158	125	58	44	39	24
Phenols	ppb	*	*	*	*	37+	*	13+	23+	63+	45+	*	12

Notes:

* Below Method Detection Limit.

[ ] Value less than detection limit specified in lab contract.

E Indicates a value estimated or not reported due to the presence of interference.

N Indicates spike sample recovery is not within control limits.

@ Indicates duplicate analysis is not within control limits.

\+ Not attributed to ground water contamination; see text.

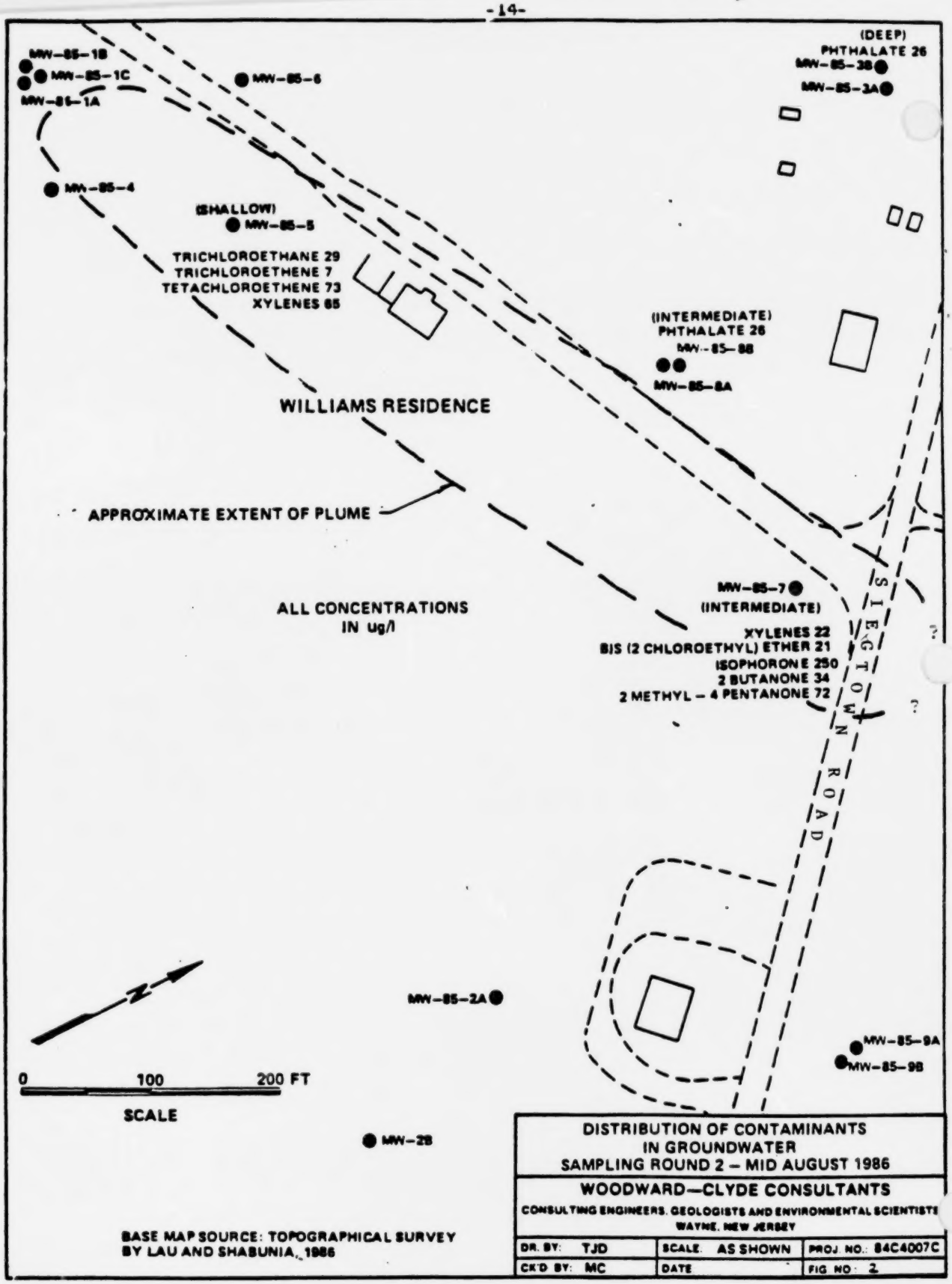
Table 1F

DIOXIN ANALYSIS OF SOIL BORING SAMPLES

COMPOUND	UNITS	COMPOSITE SAMPLE NUMBERS	88181 88153 88155	88246 88248	88278 88279	88306 88305 88301	88195 88242	88283 88285	88251 88254 88253	88243 88244	88239 88240	88289 88290	88257 88259 88275	88258 88279	FBB-530
		SAMPLING DATE	5/29/86	5/30/86	5/30/86	5/29/86	5/29/86	5/30/86	5/29/86	5/30/86	5/29/86	5/30/86	5/29/86	5/30/86	5/30/86
		SAMPLE LOCATION	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10	B-11	B-12	Field
		SAMPLE DEPTH (FEET)	0-2	8-10	2-4	0-2	4-6	8-10	0-2	8-10	2-4	6-8	2-4	6-8	Blank
Biozin	300														
Methylene Chloride	305		10(b)	(2.8)(b)	:)	20(b)	9.4(b)	20(b)	9.7(b)		(2.8)(b)	7.1(b)	(380)	31(b)	5.3
Acetone	330		20(b)	(8.8)(b)		14(b)		19(b)	20(b)		(8.3)(b)	(9.3)	4300(b)	15	
bis (2-ethylhexyl) phthalate	300		(3000	(340)			3900	(30)	15000		(140)	(110)	22000		
2-Butanone	330												(3000(b)		
Tetrachloroethene	300												5000		
Toluene	330												2400		
Ethyl Benzene	300												(410)		
Xylenes	300												6,000		
Naphthalene	310												12000		
2-Methylnaphthalene	315												5600		
Diethylphthalate	300												(510)		
bis-(methyl) phthalate	330												(370)		
bis-(n-octyl) phthalate	331							(1600					(530)		
Phenols	330												510		
Cyanide	329						1.28								
Aluminum	329		3530	544	526	5140	553	185	1680	481	1140	466	2864	833	
Antimony	307		9.68			(1.2)									
Barium	327		(.8)	(2.1)		(.7)	(1.8)		(7.1)	(1.4)	(4.2)	(1.7)	(11)	(1.5)	
Beryllium	327		(0.1												
Cadmium	327		(0.4)			0.56									
Calcium	325		(1.1)E	(83)E	(79)E	(165)E	(102)E	(101)E	(120)E	(56)E	(54)E	(74)E	(146)E	(104)E	
Chromium	329		4.5E	2.3E	(0.69)E	5.5E	1E	(0.25)E	3.5E	(0.76)E	1.6E	(0.96)E	6.7E	1.4E	
Cobalt	327					(2.2)			(0.66)		(0.8)		(1.7)		
Copper	330		3E	2.6E	(1.6)E	5.4E	3.2E	2.7E	3.9E	(2.0)E	(1.6)E	2.6E	5.5E	(2.3)E	
Iron	327		4220	211	585	5490	669	256	2050	451	985	344	4340	747	
Lead	324		5.6	12	(1.8)	4.5	(1.6)	(1.4)	(1.3)		(1.2)	(1.7)	13	3.1	
Magnesium	328		(3.0)E	(68)E	(85)E	(453)E	(29)E		(116)E	(17)E	(62)E	(19)E	(214)E	(29)E	
Manganese	306		279E	8.6E	4.4E	35E	3.6E	1.6E	11E	4.3E	5E	1.6E	31E	4E	
Nickel	308		4.4			4.5			(3.1)		(1.6)		(3.2)		
Potassium	308		(183)												
Sodium	308		(186)			(181)				(5.4)	(74)				
Tin	320		5.3			4.6									
Vanadium	308		7.2E	(0.8)E	(0.5)E	9.3E	(0.7)E		(3.0)E	(0.3)E	(1.6)E	(0.4)E	9E	(1.3)E	
Zinc	308		7.8E+3	3.6E+3	2.5E+3	15E+3	3.7E+3	4.1E+3	6.4E+3	2.1E+3	2.5E+3	5E+3	15E+3	5.2E+3	

Notes:

- Below Method Detection Limit.
- ( ) Value less than detection limit specified in lab contract.
- (b) Compound also appears in analysis of blank
- # Indicates duplicate analysis is not within control limits.



DISTRIBUTION OF CONTAMINANTS
IN GROUNDWATER
SAMPLING ROUND 2 – MID AUGUST 1986

WOODWARD—CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY: TJD	SCALE: AS SHOWN	PROJ. NO.: 84C4007C
CK'D BY: MC	DATE	FIG. NO.: 2

ensure the inclusion of those chemicals with varying degrees of environmental mobility and persistence.

Indicator chemicals selected are as follows:

Bis (2-chloroethyl) ether
Bis (2-ethylhexyl) phthalate
Methylene Chloride
Tetrachloroethene
1,1,1-trichloroethane
Total xylenes
Cadmium
Chromium
Lead
Nickel

The validity of the methylene chloride data is questionable as it was detected in field, trip or laboratory method blanks from both rounds of sampling during the remedial investigation. While the methylene chloride is likely to be an artifact of the sampling or analysis, its inclusion as a site indicator chemical is consistent with the approach of the public health assessment.

Exposure Pathways

Contamination of the soil and ground water indicate the potential for exposure to contaminants through the pathways identified in Table 2. While a variety of exposure routes are listed, this risk assessment will be focused on those likely to present the most significant exposure.

The following exposures were investigated in detail to assist in identifying the need for remedial action:

° Exposure to ground water from ingestion, inhalation and dermal contact

° Direct contact with the soil

Ground Water

The population at risk of exposure to the chemicals in the ground water (receptors) include downgradient private well users not supplied with city water. According to the Cape May County Health Department, all local downgradient homes have been connected to a municipal water supply. Residences located on Siegtown Road and Swainton-Goshen Road, from the intersection of the two roads to Route 9 (Seashore Road), are now connected to a municipal water supply.

One of the two closest municipal water supply wells is located on Route 9 next to Fairview Cemetery, approximately one and one

TABLE 2 INITIAL SCREENING OF EXPOSURE ROUTES

Rate of Exposure	Factors Influencing Exposure			Likelihood of Significant Exposure
	Chemical/Physical	Environmental	Population	
Drinking Water Ingestion Inhalation Dermal Absorption	Plume at least 600 ft east-northeast, full extent not known. Some chemicals with high vapor pressures and Henry's Law constant. Some chemicals absorbed through skin.	Water used as drinking water in past. Potential future use. Area is mostly residential with private wells use in past and possibly in the future. NJ classification GW2.	Approx. 3550 residents within 3 miles of site have used groundwater. Currently on public water supply.	High - historically. Low - now.
Direct Contact with Soil	Contamination detected at site 0-10 ft.	No fence. Minimal vegetation.	Children nearby, dogs and other animals.	Moderate.
Inhalation of Vapors and Dusts from Contaminated Soil	Low levels of volatile organics in top soil. Low HNu readings 0.00-0.30 ppm.	Great dilution of vapors upon volatilization. Minimal vegetation at spill site.	Nearby residents.	Low.
Contact with Surface Water	No analytical data available. Some volatile chemicals.	Groundwater may discharge to local gravel pits. Pits dry during RI.	Nearby residents.	Low - moderate.

half miles from the site. The other is located near the center of Cape May Court House approximately three miles from the site. Both are upgradient of the site and are, therefore, not expected to be impacted by the site.

The ground water in the area of Williams Property is designated Class GW2 by NJDEP. Class GW2 is defined as ground water having a natural total dissolved solids (TDS) concentration of 500 milligrams/liter (mg/l) or less, which is suitable for potable, industrial, or agricultural water supply after conventional water treatment (for hardness, pH, iron, manganese and chlorination) where necessary, or for the continual replenishment of surface waters to maintain the quantity and quality of the surface waters of the State, or for other reasonable uses. The Holly Beach Aquifer supplied approximately 60 percent of the potable water for Cape May County in 1981 and was reported to have great potential for future development.

Estimates of human dose from exposure to contaminants in ground water in the vicinity of Williams Property are presented in Tables 3 through 5. A realistic worst case is calculated using the maximum concentration of the contaminant detected in ground water during the sampling rounds performed for the remedial investigation in 1986. A more probable dose is calculated from the mean of ground water concentrations detected in residential and monitoring wells. When the contaminant was not detected, the contract detection limit was used to calculate the mean.

Based on the assumptions used in calculating dose, the largest estimated dose for the organic compounds is from inhalation, followed by ingestion and dermal absorption.

Soil

Exposures to contaminants in the soil can occur from inhalation of vapors or airborne dusts, or from direct contact with the soil. Since the latter is likely to be the more significant exposure, it is evaluated here.

Populations at risk of exposure from direct contact include nearby residents and visitors. An investigation of potential receptors as part of the Remedial Action Master Plan (RAMP, 1983) estimated a permanent population of 485 people within one mile of the site, with a peak campground summer population of 4,738 within one mile. These data were computed using 1980 census and updated 1976 Cape May County Planning Board Campground Study figures. Census information shows 984 persons residing within the census tract including the Williams Property. There is an average of 2.67 persons per household, with children under 5 years making up approximately 6.7 percent of the population.

TABLE 3 Total Adult Human Dose from Exposure to Organic Compounds in Groundwater.

Substance	Concentration in Water (ug/l) Maximum	Mean	Inhaled Dose (1) (ug/kg/day) Maximum	Mean	Ingested Dose (2) (ug/kg/day) Maximum	Mean	Dermal Dose (3) (ug/kg/day) Maximum	Mean	Total Dose (4) (ug/kg/day) Maximum	Mean
Bis(2-chloroethyl)ether	22	10.2	1.89	0.87	0.63	0.29	0.16	0.07	2.68	1.2
Bis(2-ethylhexyl)phthalate	1000	29.3	85.71	2.51	28.57	0.84	7.35	0.22	121.63	3.5
Methylene Chloride	10	4.7	0.86	0.40	0.29	0.13	0.07	0.03	1.22	0.5
Tetrachloroethene	100	10.2	8.57	0.87	2.86	0.29	0.73	0.07	12.16	1.2
1,1,1-Trichloroethane	50	7.3	4.29	0.63	1.43	0.21	0.37	0.05	6.08	0.8
Trichloroethene	82	5.1	7.03	0.44	2.34	0.15	0.60	0.04	9.97	0.6
Total xylene	2700	16.4	231.43	1.41	77.14	0.47	19.84	0.12	328.41	1.9

1. Inhaled dose = (concentration in air) x (20 m3 inhaled/day) / 70 kg body weight
   Concentration in air(ug/m3) = 0.3(l/m3) x concentration in water(ug/l)
2. Ingested dose = (concentration in water) x (2 liters/day) / 70 kg body weight
3. Dermal dose = (concentration in water)(SA)(F)(perm. constant)(t)(1days/7days)/70 kg
   where: F = fraction of the body exposed or 0.80
   t = length of exposure or 0.25 hours/day
   SA = total body surface area or 18000 cm2
   Perm. constant = 0.001 l/cm2 hr

TABLE 4 Total Child Dose from Exposure to Organic Compounds in Groundwater.

Substance	Concentration in Water (ug/l) Maximum	Mean	Inhaled Dose (1) (ug/kg/day) Maximum	Mean	Ingested Dose (2) (ug/kg/day) Maximum	Mean	Dermal Dose (3) (ug/kg/day) Maximum	Mean	Total Dose (4) (ug/kg/day) Maximum	Mean
Bis(2-chloroethyl)ether	22	10.2	5.28	2.45	2.20	1.02	1.65	0.77	9.13	4.23
Bis(2-ethylhexyl)phthalate	1000	29.3	240.00	7.03	100.00	2.93	75.00	2.20	415.00	12.16
Methylene Chloride	10	4.7	2.40	1.13	1.00	0.47	0.75	0.35	4.15	1.95
Tetrachloroethene	100	10.2	24.00	2.45	10.00	1.02	7.50	0.77	41.50	4.23
1,1,1-Trichloroethane	50	7.3	12.00	1.75	5.00	0.73	3.75	0.55	20.75	3.03
Trichloroethene	82	5.1	19.68	1.22	8.20	0.51	6.15	0.38	34.03	2.12
Total xylene	2700	16.4	648.00	3.94	270.00	1.64	202.50	1.23	1120.50	6.81

1. Inhaled dose = (concentration in air) x (8 m3 inhaled/day) / 10 kg body weight
   Concentration in air(ug/m3) = 0.3(l/m3) x concentration in water(ug/l)
2. Ingested dose = (concentration in water) x (1 liters/day) / 10 kg body weight
3. Dermal dose = (concentration in water)(SA)(F)(perm. constant)(t)(7days/7days)/10 kg
   where: F = fraction of the body exposed or 0.75
   t = length of exposure or 0.25 hours/day
   SA = total body surface area or 4000 cm2
   Perm. constant = 0.001 l/cm2 hr

Table 5 Total Human Dose from Exposure to Metals in Groundwater

Substance	Concentration in water (ug/l) Maximum	Mean	Ingested Dose (ug/kg/day) Adult (1) Maximum	Mean	Child (2) Maximum	Mean
Cadmium	33	5.7	0.94	0.16	3.3	0.57
Chromium	70	14.7	2.00	0.42	7	1.47
Lead	2880	129	82.29	3.69	288	12.9
Nickel	118	38.7	3.37	1.11	11.8	3.87

1. Ingested dose = (concentration in water) x (2 liters/day) / 70 kg body weight
2. Ingested dose = (concentration in water) x (1 liters/day) / 10 kg body weight

The site is accessible to neighbors; no fence exists. As ingestion of soil by children is the greatest potential risk, it is investigated here. The area is residential; it is likely that children will gain access to the site either as current or future residents of surrounding homes, or as guests. Ingestion of soil may occur inadvertantly from hand to face contact or eating following playing at the site, or as the result of pica behavior.

In the realistic worst case scenario for calculating dose, the maximum concentration of contaminants detected in the zero-two feet sample are used, as exposure to deeper soil by young children is unlikely. The realistic worst case scenario assumes an average of three exposures per week for 40 weeks a year as the ground usually remains frozen from early December to mid-March.

A more probable case scenario includes the assumptions of exposure to an average concentration of contaminants detected in the zero-two feet sample, and one exposure per week for 40 weeks.

Table 6A displays the maximum concentration of indicator chemicals in soil and comparison with applicable State criteria. The maximum concentration of metals detected within the top two feet of soil at the site and the background levels found in New Jersey and the United States are presented in Table 6B. All of the concentrations of metals found in the top two feet of soil at the Williams Property site fall within or below the ranges cited as background for the State of New Jersey and were not included in the soil ingestion calculations. The only indicator chemicals other than metals detected in the top two feet of soil are bis(2-ethylhexyl)phthalate and methylene chloride. The results from calculation of dose for these compounds are presented in Tables 7 and 8.

Data from the RI report show that the highest level of soil contamination occurred at B-11. This is confirmed both in the chemical analysis of the soil boring B-11 sample from two to four feet as well as in the headspace analysis made in the soil sample using a HNU calibrated to benzene. Because different organic chemicals elicit varying degrees of instrument response, the HNU readings are interpreted as indicating the presence of organics in the soil sample headspace, without indicating the identity or actual quantity of specific organic vapors. The results from the HNU analysis for B-11 shows a reading of 225 parts per million (ppm) for the zero-two feet sample and 250 ppm for the sample B-11 two-four feet. These values are the highest headspace readings recorded during the RI. Since the soil in the zero-two feet sample was not analyzed in the laboratory, to evaluate the risk of exposure at this location, it was assumed that the contamination in

TABLE 6A COMPARISON OF SOIL CONTAMINANT CONCENTRATIONS WITH NEW JERSEY SOIL CLEANUP CRITERIA

Substance	Maximum Concentration (mg/kg)	Criteria (mg/kg)
Bis (2-chloroethyl) ether	ND	--
Bis (2-ethylhexyl) phthalate	22.0	10
Methylene chloride	0.380	1(a)
Tetrachloroethene	5.0	1(a)
1,1,1-Trichloroethane	ND	--
Trichloroethene	ND	--
Total xylene	61.0	1
Cadmium	0.56	3
Chromium	6.7	100
Lead	13	100
Nickel	4.5	NA

ND - Not detected.
NA - Not available.
(a) - Total volatile organic compounds.

TABLE 6B CONCENTRATIONS OF INDICATOR METALS WITHIN THE TOP TWO FEET OF SOIL COMPARED WITH BACKGROUND CONCENTRATIONS

	Maximum Soil Concentration (mg/kg)	New Jersey Background[a] (mg/kg)
Cadmium	0.56	1.0 - 4.0
Chromium	5.5	5.0 - 48
Lead	5.6	1.0 - 180
Nickel	4.5	11.1 - 86.5

(a) Data from Stephen Toth or Harry Motto, Cook College, Rutgers University. Cited in NJDEP, 1986.

the zero-two feet sample was equal to that detected in the two-four feet sample. The dose was calculated using realistic worst case assumptions discussed previously.

ALTERNATIVE EVALUATION PROCESS

The remedial alternatives for the Williams Property site were developed and evaluated using the Comprehensive Environmental, Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR §300.68, and the "Guidance on Feasibility Studies Under CERCLA", as guidance. In addition, EPA Interim Guidance on Selection of Remedy memorandums dated December 24, 1986 and July 24, 1987 were considered.

The major objective of the FS is to evaluate remedial alternatives using a cost-effective approach consistent with the goals and objectives of CERCLA. According to Section 121 of CERCLA, the recommended remedial alternative should protect human health and the environment, should be cost-effective, and should utilize permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable. The proposed remedy must also attain legally applicable or relevant and appropriate federal and state public health and environmental standards, requirements, criteria, or limitations (ARARs) that have been identified for the site.

A five step process was developed and used to meet the FS objectives. The following is a summary of that process.

The first step is to evaluate human health and environmental effects associated with releases and threatened releases of hazardous substances from the site. Criteria to be considered are grouped into three categories effectiveness, implementability and cost. Both short term and long term aspects of these are considered.

The next step is to develop a range of potential available remedial technologies that could be used to remediate the site. Remedial technologies in which treatment that permanently and significantly reduces the toxicity, mobility or volume of the hazardous substances as a principal element are to be preferred over remedial technologies not involving such treatment. These technologies are initially screened on a technical basis. Based on the screening, a list of individual remedial technologies appropriate to site conditions and consistent with the remedial action objectives is developed.

The site-appropriate remedial technologies are then combined into a number of preliminary remedial alternatives. The basis for the various combinations are: the technical and logical interrelationship between separate technologies, NCP Section 300.68(f) requirements regarding the general categories of

Table 7 Dose from Ingestion of Surface Soil using Realistic Worst Case Assumptions

Substance	Maximum concentration (ug/kg)	Subchronic Dose(b) 5.0(a) (ug/kg/day)	0.1 (ug/kg/day)	Chronic Dose(c) 5.0(a) (ug/kg/day)	0.1 (ug/kg/day)
Bis(2-ethylhexyl)phthalate	15000	1.45E+00	2.91E-02	2.52E-02	5.05E-04
Methylene Chloride	20	1.94E-03	3.88E-05	3.36E-05	6.73E-07

a. Ingestion rate, dose calculated for both 0.1 and 5.0 grams per day.
b. Subchronic Dose=[conc.(ug/kg)*ingestion rate(kg/day)*(3days/7days)*(40weeks/52weeks)]/17kg
c. Chronic Dose=[conc.(ug/kg)*ingestion rate(kg/day)*(3days/7days)*(40wks/52wks)*(5yrs/70yrs)]/70kg

Table 8 Dose from Ingestion of Surface Soil using More Probable Case Assumptions

Substance	Mean concentration (ug/kg)	Subchronic Dose(b) 5.0(a) (ug/kg/day)	0.1 (ug/kg/day)	Chronic Dose(c) 5.0(a) (ug/kg/day)	0.1 (ug/kg/day)
Bis(2-ethylhexyl)phthalate	9400	3.04E-01	6.08E-03	5.27E-03	1.05E-04
Methylene Chloride	13.2	4.27E-04	8.53E-06	7.40E-06	1.48E-07

a. Ingestion rate, dose calculated for both 0.1 and 5.0 grams per day.
b. Subchronic Dose=[conc.(ug/kg)*ingestion rate(kg/day)*(1days/7days)*(40weeks/52weeks)]/17kg
c. Chronic Dose=[conc.(ug/kg)*ingestion rate(kg/day)*(1days/7days)*(40wks/52wks)*(5yrs/70yrs)]/70kg

alternatives which must be considered and CERCLA Section 121 provisions regarding the preference for remedial actions that utilize permanent solutions and alternative treatment or resource recovery technologies. EPA is in the process of revising the NCP to reflect these new provisions added by SARA. EPA's "Interim Guidance on Superfund Selection of Remedy" memorandums, issued December 24, 1986 and July 24, 1987 are intended to aid the Agency in the selection of remedial actions pending the revised NCP. EPA's interim guidance requires evaluation of alternatives involving: 1) treatment options; 2) containment of waste options with little or no treatment, but providing protection of human health and the environment primarily by preventing exposure or reducing the mobility of the waste; and 3) the no-action alternative. These three categories of alternatives must be carried through the detailed evaluation process, and should not be eliminated during previous screening processes.

The fourth step in the process is to provide an initial screening of these alternatives. The three broad criteria that should be utilized in the screening are: the relative effectiveness, implementability, and the cost of implementing the remedial action. This general screening is intended primarily to reduce the number of remedial alternatives which will subsequently be evaluated in detail.

The final step is to conduct a detailed analysis of the alternatives that remain after the initial screening. A treatment, containment and no-action alternative should be included in this analysis. For each alternative, the following factors, as appropriate, are to be considered:

- An evaluation in terms of engineering implementation, reliability, and constructibility;

- An assessment of the extent to which the alternative is expected to effectively prevent, mitigate, or minimize threats to, and provide adequate protection of human health and the environment. This includes an evaluation of the extent to which the alternative attains or exceeds ARARs for the site. Where the analysis determines that federal and state human health and environmental requirements are not applicable or relevant and appropriate, the analysis, as appropriate, evaluates the risks of the various exposure levels projected or remaining after implementation of the alternative under consideration;

- An analysis of whether recycle/reuse, waste minimization, waste biodegration, or destruction, or other advanced, innovative, or alternative technologies is appropriate to reliably minimize present or future threats to human health and the environment;

- An analysis of any adverse environmental impacts and methods for mitigating these impacts, and costs of mitigation;

- A detailed cost estimation, including operation and maintenance costs, and distribution of costs over time.

DEVELOPMENT OF ALTERNATIVES AND INITIAL SCREENING

The remedial investigation conducted at the Williams Property site was used to develop remedial objectives dealing with protection of both human health and the environment. The results of the RI indicate that the ground water of the Holly Beach Aquifer is contaminated.

The contaminant transport pathways impacting on human and environmental receptors are the movement of ground water and contaminants from the site, and associated direct contact and ingestion of contaminated surface soils and groundwater.

Based on the above considerations the primary remedial response objectives are:

- Mitigation of migration of contaminated ground water in the Holly Beach Aquifer.

- Remediation of contaminated ground water in the Holly Beach Aquifer.

- Mitigation of leaching from contaminated site soils into the ground water and prevention of direct contact.

Based on site information from the remedial investigation, general response actions or classes of response actions have been identified without identifying specific technologies. The general response actions considered include the no-action alternative as a base line against which other response actions can be measured. Technologies in each general response action were identified. Technologies considered for remediating ground water contamination and soil contamination are presented in Table 9 and Table 10, respectively. Technologies which address other factors affecting remediation are presented in Table 11.

Technologies in each general response action were screened to eliminate inapplicable and infeasible technologies based on site-specific conditions. Technologies that were screened and eliminated are presented in Table 12 along with the reason for their elimination.

The remaining feasible technologies were assembled into alternatives. Applicable or relevant and appropriate requirements were considered in selecting and combining technologies into alternatives to achieve specific cleanup goals.

GROUND WATER REMEDIAL ALTERNATIVES

Seven ground water alternatives have been developed. Each one of these ground water alternatives incorporate various types of treatment systems which will permanently remove contaminants from the ground water and, thereby, reduce their toxicity, mobility and volume.

Alternative 1 - Extraction, Air Stripping, and Recharge

In this alternative, contaminated ground water is extracted, treated at an on-site water treatment system and recharged to the ground. The objective of this alternative is to reduce the concentration of contaminants in the ground water to levels where the potential risk to human health and the environment are reduced to acceptable levels, and to hydraulically control the migration of contaminants in the ground water.

Extraction wells with submersible pumps would be utilized in this alternative to extract the contaminated ground water. The design of the system would entail further hydrogeologic investigation.

The contaminated ground water will be passed through a counter-current air stripping column to enhance the exchange of organics from the aqueous stream to an effluent air stream. Air stripping will perform successfully, given the conditions at the Williams Property site. Removal of volatile organic contaminants from water at low influent concentrations is common practice. A high degree of removal is anticipated for the volatile organic contaminants. Semi-volatile organic contaminants would be only marginally removed, while metals would be essentially untreated.

Due to the fact that the primary sections of an air stripping operation contain no moving parts, the operation and maintenance requirements are minimal and the reliability of the air stripping equipment is good.

Operation of an air stripper should pose no threat to individuals working on or near the treatment equipment. The issue of air contaminant emissions must be addressed so that such discharges can comply with air emission standards. While the organic contaminants transferred to the vapor phase are not expected in concentrations that would cause human health concern, the need for emission control systems on the air stripping unit would be further considered during design.

Recharge of the treated ground water offers several benefits: 1) reduction of the duration of treatment, 2) minimal effects from drawdown during ground water recovery, and 3) creation of a ground water boundary to detour inflow from outside the target

TABLE 9 TECHNOLOGIES CONSIDERED
FOR REMEDIATING GROUNDWATER CONTAMINATION

1. Groundwater Containment

   a. Sheet Piling*
   b. Grout Curtain*
   c. Slurry Wall*
   d. Hydraulic Barrier
   e. Surface Capping*

2. Groundwater Treatment

   a. Air Stripping
   b. Activated Carbon Adsorption
   c. Resin Adsorption*
   d. Biological Treatment*
   e. Precipitation/Flocculation/Sedimentation
   f. Ozonation*
   g. Wet Air Oxidation*
   h. Steam Stripping*
   i. Ion Exchange
   j. Reverse Osmosis*

3. Groundwater Recovery and Disposal

   a. Pumping
   b. Publicly Owned Treatment Works*
   c. Surface Water Discharge*
   d. Groundwater Recharge
   e. Discharge to Ocean*

* Technology eliminated in screening.

TABLE 10 TECHNOLOGIES CONSIDERED FOR REMEDIATING SOIL CONTAMINATION

1. Soil Treatment
   a. On-Site Incineration
   b. Off-Site Incineration
   c. On-Site Soil Vacuuming
   d. On-Site Extraction/Flushing*
2. Soil Disposal
   a. Off-Site Disposal
   b. On-Site Disposal

TABLE 11 TECHNOLOGIES THAT ADDRESS OTHER FACTORS AFFECTING REMEDIATION

1. No Action
2. Institutional Controls

TABLE 12 SCREENING OF ALTERNATIVE TECHNOLOGIES

Possible Technology	Retained (R) or Eliminated (E)	Reason for Elimination
Technologies Considered for Remediating Groundwater Contamination		
1. Groundwater Containment/Extraction		
a. Grout Curtain	E	The use of grout curtains was considered as a method for containing groundwater. However, slurry walls provide the same level of effectiveness for about one third the cost.
b. Sheet Pilings	E	This alternative was eliminated for the same reason as the grout curtain.
c. Slurry Walls	E	Although a cheaper containment alternative than grout curtains or sheet pilings, the depth to the confining layer makes this technology impractical.
d. Hydraulic Barrier	R	
e. Surface Capping	E	The majority of the waste contaminated soils have been excavated, surface capping is more applicable to landfills.
2. Groundwater Recovery and Disposal		
a. City Publicly Owned Treatment Works	E	Aquifer water supply is needed as a drinking water source. Publicly owned treatment does not exist.
b. Surface Water Discharge	E	The surface waters nearest the site -- small water filled gravel pits are inappropriate. Surface streams are not located near the site -- loss of fresh water.
c. Groundwater Recharge	R	

TABLE 12 (Continued) SCREENING OF ALTERNATIVE TECHNOLOGIES

Possible Technology	Retained (R) or Eliminated (E)	Reason for Elimination
d. Discharge to Ocean	E	Loss of fresh water, too great a distance to ocean
e. Groundwater Pumping	R	
3. Groundwater Treatment		
a. Air Stripping	R	
b. Activated Carbon Adsorption	R	
c. Resin Adsorption	E	Activated carbon can produce similar efficiencies at lower cost.
d. Steam Stripping	E	Energy intensive and, therefore, costly. Air stripping is equally effective and less costly.
e. Biological Treatment	E	Not effective at low concentrations. Standard biological reactors are not designed for influents below 50-70 mg/l. Many chlorinated compounds are non-biodegradable or refactory.
f. Wet Air Oxidation	E	Not effective at low concentrations; energy intensive.
g. Ozonation	E	Requires that ozone be produced on-site. Because production of ozone is expensive, ozonation was eliminated.
h. Chemical Precipitation and Solids Separation	R	
i. Ion Exchange	R	
j. Reverse Osmosis	E	Difficult to implement and operate. A combination of carbon adsorption and metal precipitation is equally feasible with lower costs.

TABLE 12 (Continued) SCREENING OF ALTERNATIVE TECHNOLOGIES

Possible Technology	Retained (R) or Eliminated (E)	Reason for Elimination
Technologies Considered for Remediating the Soil		
1. Off-Site Disposal	R	
2. On-Site Disposal	R	
3. On-Site Incineration	R	
4. Off-Site Incineration	R	
5. On-Site Stabilization/Solidification	E	Soil already passes the Toxicity Characteristic Leaching Procedure (TCLP)
6. Soil Flushing/Extraction	E	Decontamination of the soils is not feasible due to large degree of variation of the contaminants and their distribution.
7. In-Situ Thermal Destruction	R	
8. Soil Vacuuming	R	
Access Restrictions		
1. Signs	R	
2. Fencing	R	
3. Security Guards	E	Site conditions does not warrant this level of security.

zone. Recharge of the treated water also preserves freshwater in an area subject to saltwater intrusion. Recharge will raise the level of ground water in the localized area around the recharge wells. This should not have an adverse impact on surface drainage characteristics or vegetation. Recharge wells will be carefully located to ensure that building foundations, roadways, or other facilities are not impacted. Public health and environmental impacts of volatile organics will be minimized by air stripping. However, impacts associated with the semi-volatile organics in the ground water will remain. In addition, metals detected in the ground water would not be removed. The pumping and piping equipment associated with the recharge system is conventional, relatively inexpensive, and will require minimum maintenance.

Alternative 2 - Extraction, Carbon Adsorption, and Recharge

This alternative will have a similar extraction and recharge system as Alternative 1. However, contaminated ground water will be passed through a bed of granular activated carbon that will adsorb the organic constituents from the aqueous phase. Carbon adsorption has been shown to be effective in removing both volatile and many non-volatile organic compounds to low levels. In addition, certain inorganics have been shown to have moderate to high sorption potential.

A significant amount of operating experience has been gained and carbon can be considered a proven and reliable treatment for ground water contamination. A monitoring program for the carbon system effluent must be implemented in order to change the granular carbon at the optimum time and to ensure that breakthrough has not occurred.

Operation of a granular activated carbon system poses no threat to individuals working on or near the treatment equipment. However, the treatment process does generate a hazardous residue -- the spent carbon that must be disposed of in accordance with the appropriate institutional requirements or regenerated. In addition, carbon adsorption is not expected to remove all of the metals detected in the ground water.

Alternative 3 - Extraction, Air Stripping, Carbon Adsorption, and Recharge

This treatment alternative would combine the technologies of air stripping and carbon adsorption, as discussed previously. Air stipping can achieve a high degree of removal of volatile organics, but the technology is not as effective for non-volatiles.

Carbon adsorption has been shown to be effective in treating many non-volatile organics and some metals. Therefore, this combination of technologies provides more effective treatment than either technology alone.

Alternative 4 - Extraction, Air Stripping, Carbon Adsorption, Precipitation, Flocculation, Sedimentation, and Recharge

In addition to the technologies mentioned in Alternative 3, a precipitation, flocculation, and sedimentation process would be included.

Under this alternative, extracted ground water containing soluble metals would be precipitated by chemical precipitation, flocculated, and then removed by sedimentation. The processes have been widely used, the equipment is relatively simple, the process can be applied to very large volumes of wastewater, and the energy consumption is low. However, because of the potentially changing concentration of metals in extracted ground water, required dosages of precipitants and coagulants may continuously change. In addition, large quantities of metal precipitate sludges would be generated.

Alternative 5 - Extraction, Air Stripping, Precipitation, Flocculation, Sedimentation, and Recharge

In addition to the technologies mentioned in Alternative 1, a precipitation, flocculation, and sedimentation process would be included as discussed under Alternative 4.

Alternative 6 - Extraction, Carbon Adsorption, Precipitation, Flocculation, Sedimentation, and Recharge

A precipitation, flocculation, and sedimentation process as discussed under Alternative 4, would be added to the treatment process described in Alternative 2.

Alternative 7 - Extraction, Air Stripping, Carbon Adsorption, Ion Exchange, and Recharge

Under this alternative, extracted ground water would be passed through ion exchange resins to remove soluble metallic elements in addition to treatment for organics by air stripping and carbon adsorption. Ion exchange is considered applicable for removal of soluble metals, either cationic or anionic, and is routinely used in the electroplating industry to remove impurities from rinse waters. Suspended matter must be low so as not to foul the resins. In addition, some organics, especially aromatics, can be irreversibly adsorbed by the resin, resulting in decreased capacity.

Due to the need to regenerate the resin frequently, operation and maintenance costs are high compared to other treatment processes. In addition, the spent regenerant has the potential for containing high concentrations of contaminants. There is some risk of exposure to workers and the public from the highly acidic or caustic solutions used as resin regenerates.

SOIL REMEDIAL ALTERNATIVES

Each of the soil remediation alternatives assumes treatment of a maximum area of 125 feet by 175 feet by 5 feet (approximately 4,000 cubic yards). The area encompasses all borings having any positive HNU reading during the remedial investigation. A sensitivity analysis was conducted for the excavation alternatives to evaluate the effect of variation of the volume of soil excavated, and are identified as Case I and Case II, respectively, in the FS. Case II involved a reduced area of 75 feet by 25 feet by 10 feet (approximately 700 cubic yards), and was based on boring locations with HNU headspace readings of 15 ppm or greater. This occurred only at Borings B-10 and B-11 at depths of zero to eight feet in B-11 and zero to four feet at B-10.

The high HNU readings in Boring B-11 correlate well with the chemical analysis of soils from B-11. These chemical analyses indicate that the highest concentrations of organic compounds occurred at location B-11. The Case II volume of 700 cubic yards is estimated to represent the quantity of soil with the highest organic contaminant concentrations. The excavation and removal of the Case II volume is currently estimated to be that which is required to achieve a target level of one part per million of total volatile organic compounds in remaining soils. This cleanup objective has been developed by NJDEP and used in the ECRA program. It reflects the relative persistence and mobilities of organic compounds.

The following six alternatives have been developed.

Alternative 1 - Excavation of Soil, Disposal in Off-Site Permitted Hazardous Waste Landfill, Surface Grading, and Revegetation

This alternative includes site excavation, off-site hauling, off-site disposal, and site restoration. Specifically, this alternative removes contaminated soils to an approved hazardous waste facility and, therefore, is highly effective in meeting cleanup goals at the site. The remediation is permanent for the existing site; the reliability is rated high, as off-site disposal is a proven technology. Since this alternative does not involve installation of sophisticated and complex treatment systems on-site, it is considered relatively easy to implement. Off-site disposal of contaminants eliminates the potential for exposure and contaminant migration at the existing site. Transportation of the hazardous materials will result in a small risk to public health and the environment along the transportation route. Exposures to subsurface soils during excavation may result in short-term exposure to contaminated dusts or gases on-site. Excavation will be backfilled with clean native soils. The final surface of backfill will be graded to converge with local topography, and revegetated.

Alternative 2 - Excavation of Soil, On-Site Disposal in Constructed Landfill, Surface Grading, and Revegetation

This alternative is similar to Alternative 1. However, contaminated soils will be excavated and disposed of in an on-site constructed landfill. This will eliminate the risk to human health and the environment along an off-site transportation route. Although this alternative reduces the mobility of contaminants, it does not reduce the toxicity and, therefore, potentially impacts its long term effectiveness.

Alternative 3 - Installation of Vacuum Extraction Well and Soil Vacuuming System

In this alternative, volatile organic compounds (VOC) are extracted from the contaminated soils above an aquifer by inducing a flow of air through the soil; the volatile contaminants are expected to migrate from the soil into a piping system under vacuum. A vacuum would be applied to the soil through extraction wells constructed with perforations above the water table. A conventional industrial blower will provide the vacuum.

Although this volatilization technique is considered to be a relatively new process for treating VOC-contaminated soil, it is similar in principle to some well established technologies, such as air stripping and landfill gas extraction.

Soil vacuuming works well when there is a substantial cover of contaminated unsaturated soil above the water table and when the contaminated soil is porous enough to permit a significant flow of air through the zone of contamination under a modest applied vacuum.

Due to the simplicity of the system, the operation and maintenance requirements are minimal and the reliability of the system is good.

Operation of the vacuuming system poses no threat to individuals working on or near the treatment equipment. However, the vented off-gas may pose environmental and public health concerns. The extracted VOCs will be vented directly to the atmosphere, although a collection system (e.g., vapor phase carbon) could be provided if necessary.

Vacuuming will minimize the VOCs in the soil, but will not address the environmental and public health concerns of non-volatile organics. Similiarly, metals would not be affected.

Alternative 4 - Excavation of Soils, Off-Site Incineration, Surface Grading, and Revegetation

This alternative includes site excavation, off-site hauling, off-site incineration, and site restoration. Specifically,

this alternative removes contaminated soils to an approved hazardous waste treatment facility and, therefore, is highly effective in meeting cleanup goals at the site. This alternative provides a permanent treatment technology to reduce the toxicity and mobility of the principle threat at the site. Transportation of the hazardous materials will result in a small risk to public health and the environment along the transportation route. Destruction and removal efficiencies of organic constituents will be expected to be excellent.

Alternative 5 - Excavation of Soils, On-Site Incineration, Surface Grading, and Revegetation

This alternative includes site excavation, on-site incineration, and site restoration. This alternative provides a permanent treatment technology to reduce the toxicity and mobility of the principle threat at the site. This alternative eliminates the risk to public health and the environment associated with transportation of contaminated soils off the site. However, there is the additional public health and environmental concerns associated with operating an incinerator in a residential area. The length of time to implementation of this alternative would be greater than utilizing existing off-site incineration facilities currently in operation.

Alternative 6 - In-Situ Destruction

This alternative involves physical manipulation of the subsurface in order to immobilize or detoxify waste constituents. In-situ vitrification is a technology being developed for the stabilization of contaminated wastes and is conceivably applicable to other hazardous wastes. Contaminated soil is converted into durable glass, and wastes are pyrolyzed or crystallized. Off-gases released during the melting process are trapped in an off-gas hood. Soil moisture can increase operating costs by increasing fuel requirements because the water in the soil must be evaporated. Several laboratory-scale and pilot-scale tests have been conducted, and a large-scale testing system is currently being fabricated.

ALTERNATIVES ADDRESSING OTHER FACTORS OF REMEDIATION

Alternative 1 - No Action

Under this no-action alternative, remedial activities are not performed. Contaminated ground water is left in its current condition. NJDEP would implement restrictions on installing any new wells in the area. Monitoring would be provided in the plume area and on the perimeter of the plume. This would permit early detection of contaminant migration and alert regulatory agencies to the potential exposure to residents of contaminated water. Existing monitoring wells and residential wells would be used for the monitoring program.

This alternative implies that there is no threat posed by the contaminants present at the Williams Property site and that no remedial action will be implemented. However, the ground water contamination poses a potential risk to the public health and environment. The ground water contamination can be considered a threat to potential receptors, and the potential for migration of contaminants in the aquifer would continue to exist. The ground water plume could eventually appear in wells downgradient from the site. Potential contamination release and pathways would remain unchecked, and the site would continue to be a potential source of future contamination. There are no construction or capital improvements in this alternative, and time is not a criterion. However, receptors could be exposed at some future time if migration of ground water contaminants were to continue to occur downgradient.

Alternative 2 - Institutional Controls

This alternative includes any activity which would facilitate remedial action and the protection of any remedy implemented during the remedial action. This option may include, but is not limited to, installation of a perimeter fence around the site, institution of a drilling ban within the affected area, and closure of existing wells. Specific institutional controls would be identified under the remedial design phase.

EVALUATION OF ALTERNATIVES

According to 40 CFR Section 300.68(i) of the NCP, the appropriate extent of remedy shall be determined by the lead agency's selection of a cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of human health and the environment. In addition, SARA also requires permanent solutions and alternative treatment technologies or resource recovery options to the greatest extent practicable.

Aside from the no-action and institutional control alternatives, a total of thirteen remedial alternatives (seven for ground water; six for soils) were evaluated in detail. Table 13 lists each alternative and its associated present worth costs. In addition it provides a summary of other factors considered in the evaluation.

The no-action and institutional control alternatives were found to provide inadequate protection of human health and the environment since contaminated ground water would continue to migrate and potentially impact private wells; and the contaminated soils would continue to act as a source of future contamination of the ground water.

GROUND WATER REMEDIAL ALTERNATIVES

Alternative 1 - Extraction, Air Stripping, and Recharge

Although the implementation of this alternative would effectively reduce the levels of volatile organics to meet state and federal requirements, this alternative would not adequately address the environmental and human health concerns associated with non-volatile organic compounds and metals. Therefore, the combination of extraction, air stripping, and recharge is not considered a viable ground water alternative.

Alternative 2 - Extraction, Carbon Adsorption, and Recharge

The implementation of this alternative would effectively reduce levels of contamination to meet state and federal requirements for organics and some metals. However, the cost for this alternative far exceeds the costs of the other alternatives and does not provide substantially greater protection or technical reliability.

Alternative 3 - Extraction, Air Stripping, Carbon Adsorption, and Recharge

The implementation of this alternative would effectively reduce levels of contamination to meet state and federal requirements for organics, and would lower activated carbon usage rates and costs through the use of the air stripping unit. Long-term risks associated with exposure to contaminated ground water would be reduced with this treatment system.

Installation of an extraction, air stripping, carbon adsorption, and recharge system would be implemented using established technology and construction practices. The reliability of the selected treatment system is based on the existing water quality and contaminants identified.. Both treatment technologies would utilize equipment that is commercially available and has well documented histories of treatment efficiency in similar applications. This alternative provides a highly protective and permanent solution to the ground water contamination in the aquifer, and is cost-effective.

The short-term health effects related to Alternative 3 include exposure to volatile organic air emissions from the air-stripping tower. These emissions, if not controlled properly, could exceed regulated air standards.

Another short-term impact associated with Alternative 3 involves increased traffic resulting from the off-site transportation of spent carbon. In addition, carbon adsorption systems require the use of pressure vessels which, if not properly operated, could rupture.

TABLE 13

WILLIAMS PROPERTY COST SUMMARY

Ground Water Alternatives	Capital	Annual O&M	Total Present Worth	Time to Implement	Comments
1. Extraction, Air Stripping, Recharge	$86,750	$ 11,400	$156,800	5-10 years	Effectively removes VOCs; less efficient with semi-volatiles.
2. Extraction, Carbon Adsorption, Recharge	$130,250	$132,200	$942,570	5-10 years	Effective in removing both VOCs and semi-volatiles. More cost intensive.
3. Extraction, Air Stripping, Carbon Adsorption, Recharge	$160,250	$ 64,600	$557,190	5-10 years	Combination of technologies providing higher degree of treatment for VOCs and semi-volatiles.
4. Extraction, Air Stripping, Carbon Adsorption, Precipitation, Flocculation, Sedimentation, Recharge	$360,250	$104,600	$1,002,975	5-10 years	Adds soluble metals removal to technology in Alternative 3.
5. Extraction, Air Stripping, Precipitation, Flocculation, Sedimentation, Recharge	$286,750	$ 51,400	$348,200	5-10 years	Soluble metals would be removed in addition to VOCs removal. Semi-volatiles not addressed.
6. Extraction, Carbon Adsorption, Precipitation, Flocculation, Sedimentation, Recharge	$320,250	$174,200	$1,390,640	5-10 years	Combines technology of Alternative 2 with soluble metals removal.

	Capitol	Annual O&M	Total Present Worth	Time to Implement	Comments
7. Extraction, Air Stripping, Carbon Adsorption, Ion Exchange, Recharge	$ 430,250	$139,600	$1,288,040	5-10 years	Combines technology of Alternative 3 with ion exchange for soluble metal removal. Cost intensive.
Soil Alternatives					Alternative 3 with ion exchange for soluble metal removal. Cost intensive.
1. Excavation, Off-Site Landfill, Regrading, Revegetation					
a) Case I (4000 cubic yards)	$1,442,500	N/A	$1,442,500	<1 year	Removes contaminants from site, but does not include treatment preferences of SARA. "Land Ban" Impact.
b) Case II (700 cubic yards)	$ 248,500	N/A	$ 248,500	<1 year	
2. Excavation, On-Site Landfill, Regrading, Revegetation					
a) Case I (4000 cubic yards)	$1,445,000	$101,150	$2,066,530	2 years	Long term requirement of monitoring landfill and wells. "Land Ban Impact".
b) Case II (700 cubic yards)	$1,300,500	$ 91,035	$1,859,870	2 years	
3. Soil Vacuuming	$ 189,000	$ 20,000	$311,890	1-2 years	Permeability of soils is too high and depth to ground water too little makes this technically unreliable.

Soil Alternatives (Cont'd)	Capital $	Annual O&M	Total Present Worth	Time to Implement	Comments
4. Excavation, Off-Site Incineration, Regrading, Revegetation					
a) Case I (4000 cubic yards)	$2,050,000	N/A	$2,050,000	1-2 years	Permanent destruction of waste complies with RCRA and SARA.
b) Case II (700 cubic yards)	$ 353,500	N/A	$ 353,500	<1 year	Will be less time intensive to implement than on-site incineration.
5. Excavation, On-Site Incineration, Regrading, Revegetation					
a) Case I (4000 cubic yards)	$ 1,240,000	N/A	$1,240,000	1-2 years	Permanent destruction of waste via mobile incinerator. Must comply with air quality requirements.
b) Case II (700 cubic yards)	$ 353,000	N/A	$ 353,500	<1 year	
6. In-Situ Destruction	$ 10,935,000	N/A	$10,935,000	2 years	Extremely cost intensive and does not provide higher degree of protectiveness.
Other Alternatives					
No Action	0	$50,000	$ 307,230	----	No further action except for monitoring existing wells. Restrictions on new wells.
Institutional Controls	$ 25,000	$50,000	$ 332,230	----	Fencing, closure of existing wells

Alternative 4 - Extraction, Air Stripping, Carbon Adsorption, Precipitation, Flocculation, Sedimentation, and Recharge

The short-term impacts associated with Alternative 3 are the same in Alternative 4. In addition, the use of flocculants and precipitants is required. These additional compounds may include ferric chloride, alum, lime, sodium hydroxide, and sodium sulfide. Transportation and use of these compounds increases the possibility of an accidental release that could affect workers and the public. However, the use of this treatment system will reduce the long-term health risks from the contaminated ground water after treatment.

The technical concerns of Alternative 4 include those discussed under Alternative 3 and the additional concerns associated with precipitation, flocculation, and sedimentation. These are well developed processes that have been commonly and successfully applied to the treatment of various industrial wastewaters containing soluble heavy metals. The equipment is commercially available and has a well-documented history of treatment efficiency.

In addition, the metals removal process for this alternative significantly increases the cost beyond that of Alternative 3. While metals removal would be comparatively significant, the metals detected have not been indicated to pose a public health problem. The levels detected are within ranges found in background. Therefore, this alternative was eliminated because it far exceeds the cost of other alternatives without providing substantially greater protection or technical reliability.

Alternative 5 - Extraction, Air Stripping, Precipitation, Flocculation, Sedimentation and Recharge

The short-term problems associated with Alternative 4 are the same in Alternative 5, with the exceptions of carbon use, transportation, and disposal.

The technical feasibility concerns associated with Alternative 5 are the same as those discussed in Alternative 4, with the exception of concerns involving carbon adsorption. This alternative would only provide reduction of volatile organics and metals to state and federal requirements. Non-volatile organics would not be reduced significantly by this alternative, and, therefore, would not be adequately protective of human health and the environment.

Alternative 6 - Extraction, Carbon Adsorption, Precipitation, Flocculation, Sedimentation, and Recharge

The level of protection and technical reliability of this alternative is equivalent to that of Alternative 4. Since the cost for this alternative far exceeds the cost for Alternative 4, however, Alternative 6 has been eliminated from further consideration.

Alternative 7 - Extraction, Air Stripping, Carbon Adsorption, Ion Exchange and Recharge

Although implementation of this alternative would effectively reduce levels of contamination to meet state and federal requirements for organics and metals, this alternative has been screened from further consideration due to the high cost of its implementation. The cost for this alternative far exceeds the cost of Alternative 4 and does not provide substantially greater protection or technical reliability.

SOIL REMEDIAL ALTERNATIVES

Alternative 1 - Excavation, Off-Site Disposal, Surface Grading and Revegetation

The short-term effects of Alternative 1 include the release of potentially contaminated dust particles and volatiles during excavation. Without proper controls, these fugitive emissions could cause short-term health problems for workers and the nearby public. The routes of exposure would include inhalation, contact, and ingestion. At the Williams Property site the contamination by volatile organics and semi-volatiles is greater in subsurface soils in sample B-11 than in the top soils. During the excavation, exposure of workers to the subsurface contaminants is likely. Chemicals may volatilize during excavation. Following dilution in ambient air, however, exposures to off-site neighbors are not likely to be significant. Health and safety monitoring for the presence of volatile organics will warn workers of high airborne concentrations and the need for protective equipment usage.

Should the level of dust become significant during excavation, dust control methods would be used to reduce the dust exposures. These control methods may include covering all areas except the active work face with polyethylene sheeting, and using dust-suppression methods such as foam for the active work areas.

Because of increased logistical requirements (heavy equipment uses, and transportation and disposal of excavated dirt), a short-term risk of vehicle accidents on public roads and on the site exists. Accidental release of contaminated soils from vehicles could also occur. The long-term health risk is nearly eliminated since the contamination source will be removed.

Off-site disposal of wastes must comply with RCRA regulations (40 CFR Parts 261-265). RCRA manifest requirements, under 40 CFR Parts 262 and 263, must be complied with for all wastes that are shipped off the site. The waste generator must comply with RCRA manifest requirements under 40 CFR Parts 262 and 263, and the generator should comply with applicable hazardous waste generator requirements under 40 CFR Part 262. In addition, the facility selected to receive the wastes must

be in compliance with all applicable federal and state environmental and public health statutes. Under 40 CFR 264.12, RCRA storage and disposal facilities are required to notify the generator, in writing, that they are capable of managing the wastes.

The transportation of hazardous wastes is regulated by the Department of Transportation, the Environmental Protection Agency, and the State. Applicable Department of Transportation regulations include Department of Transportation 49 CFR Parts 172-179; Department of Transportation 49 CFR Part 1387 (46 FR 30974, 47073); and Department of Transportation DOT-E 8876.

Excavation, transportation, and off-site disposal can be implemented using established technology and construction practices. Excavation is reliable in that it removes the source of contamination from the site. However, the excavated soil may become a source of future contamination at the off-site disposal location. Although the cost for this alternative is relatively low, under SARA, off-site disposal, without treatment does not meet the SARA preference to reduce toxicity through the use of treatment. This option was eliminated.

Alternative 2 - Excavation of Soil, On-Site Disposal in Constructed Landfill, Surface Grading, and Revegetation

This alternative offers the advantage of minimizing the risk to human health and the environment by eliminating off-site transportation. However, RCRA requires all owners and operators of land disposal facilities to establish a ground water monitoring program (40 CFR Part 264, Subpart F). Once established, ground water monitoring programs must continue for an average of 30 years depending on site-specific conditions. These requirements significantly impact the long term cost of the alternative. The construction and maintenance requirements for such a facility sized for the relatively small quantities of soil at this site impacts its implementability. In addition, this alternative does not meet the SARA preference to reduce toxicity through the use of treatment. As a result this option was eliminated from further consideration.

Alternative 3 - Installation of Vacuum Extraction Wells and Soil Vacuuming System

This alternative has been screened from further consideration because it is not considered feasible or reliable for the location and conditions at the site. For this alternative to be successful it is required that the depth to ground water be great enough that there is a substantial cover of contaminated, unsaturated soil above the water table (at least 10 feet) and that the contaminated soil be pervious enough to permit a significant flow of air through the zone of contamination under a modest applied vacuum. Hydrogeological investigations conducted of the site during the

remedial investigation indicated a water table generally less than 10 feet in depth. Therefore, because site specific conditions limit the effectiveness of this alternative, it has been eliminated from further consideration.

Alternative 4 - Excavation, Off-Site Incineration, Surface Grading and Revegetation

The short-term problems associated with Alternative 4 are the same as in Alternative 1 except for additional concerns associated with air emissions from the incineration facility. However, the long-term risk is nearly eliminated since the contamination source will be eliminated by incineration, thereby satisfying SARA's preference for treatment which permanently reduces toxicity.

Excavation of contaminated soils and off-site incineration would be implemented using established technology. Rotary kiln incineration has well-documented histories of treatment efficiency in similar applications.

Incineration facilities which would be utilized are only those operating in compliance with all appropriate requirements. Air emission risks are, therefore, considered addressed.

Alternative 4 has been determined to be cost-effective when compared to the other soil alternatives. Alternative 5 (below) is equal in cost, but cannot be implemented in as timely a manner as Alternative 4. When compared to the remaining soil alternatives, this option is significantly lower in cost, while providing a permanent remedy.

Alternative 5 - Excavation, On-Site Incineration, Surface Grading and Revegetation

The short-term effects of Alternative 5 include the release of potentially contaminated dust particles and volatiles during the excavation. These concerns have been discussed under Soil Alternative 1. In addition, there are health risks associated with exposures to the incinerator off-gases. These exposures could effect both workers and the nearby general public. Incinerator emissions would be controlled with appropriate technologies. Alternative 5 will have similar institutional requirements and technical reliability as discussed in Soil Alternative 4.

Although, this alternative meets the criteria of protectiveness, permanence and cost-effective, it will take more time to implement and complete than Alternative 4. As such, this alternative was eliminated.

Alternative 6 - In-Situ Soil Destruction

This alternative is an order of magnitude greater than the other alternatives in terms of cost and does not provide significantly greater environmental or public health protection. Therefore, this alternative has been eliminated from further consideration.

SELECTED REMEDY

After review and evaluation of the remedial alternatives in light of their relative effectiveness, implementability, and cost, EPA and NJDEP presented ground water Alternative 3 and soil Alternative 4 to the public as the preferred remedy for the Williams Property site. Consistent with the input received during the public comment period, which consisted primarily of questions and statements transmitted at the public meeting held on August 18, 1987, these alternatives have been selected by EPA and NJDEP as the remedial solution for the site. The major components of the selected remedy are:

Ground Water (Alternative 3)

1. The leading edge of the contaminated ground water plume will be determined during design. This determination will involve a detailed hydrologic investigation. The investigation will also determine the number of wells needed, and where to place them to efficiently extract the plume.

2. The contaminated ground water will be brought back to the site and will be passed through a countercurrent air stripping column to enhance the exchange of organics from the aqueous stream to an effluent air stream. Air stripping is expected to perform successfully, given the conditions at the Williams Property site. Removal of volatile organic contaminants from water at low influent concentrations is common practice and a high degree of removal is expected at this site.

3. The partially treated ground water will then be passed through a bed of granular activated carbon that will absorb any remaining organic constituents from the aqueous phase. Carbon adsorption has been shown to be effective in removing both volatile and many non-volatile organic compounds to low levels. In addition, certain inorganics have been shown to have moderate to high sorption potential.

4. The treated ground water will be recharged back to the aquifer underlying the site. Recharge of the treated ground water offers several benefits: (1) reduction of the time duration of treatment, (2) minimal effects from drawdown during ground water recovery, and (3) creation of a ground water boundary to detour inflow from outside the target zone. Recharge will raise the level of ground

water in the localized area around the recharge wells. This should not have an adverse impact on surface drainage characteristics or vegetation. The recharge facility will be carefully located to ensure that building foundations, roadways, or other facilities are not impacted by activities associated with ground water recharge. The pumping and piping equipment associated with the recharge system is conventional, relatively inexpensive, and will require minimum maintenance.

Soils (Alternative 4; Case II)

1. The most highly contaminated soils, as defined by positive HNU readings in soil borings of 15 parts per million or greater, will be excavated. The amount of excavated material is currently estimated to be 700 cubic yards (Case II). It is anticipated that removal of this volume of material will meet the soil cleanup objectives developed by the State of New Jersey and used in the ECRA program (one ppm total volatile organics).

2. The excavated soil will be transported off-site to an existing approved hazardous waste facility for incineration.

3. The excavated area will be backfilled with clean native soils.

4. The final surface of backfill will be graded to converge with local topography and revegetated.

Water Supply

At the present time, it is believed that all but one residence with a private well in the immediate vicinity of the site has been connected to a public water supply system. That single residential well, located on the Williams Property site, is known to be contaminated and has been taken out of service. The selected remedy will provide an alternate source of potable water to this residence as well as any others found to be impacted by the site.

COST EFFECTIVENESS, PROTECTIVENESS AND PERMANENCE

As mentioned previously, Table 13 presents a summary of the remedial alternatives, including the cost of the alternatives. An alternative is considered cost effective if it will attain the required cleanup levels at a reasonable cost. The selected remedy for the ground water and for the soil accomplishes this.

The ground water remedy provides a highly protective and permanent solution to the contamination of the Holly Beach Aquifer at about one half the cost of the next best alternative (Alternative 4).

Off-site incineration provides a permanent solution to the residudal contamination in the soils. It is equal in cost to on-site incineration (Alternative 5), but will not involve creating a possible new source of air contamination in the area. When compared with the other soil alternatives the selected remedy provides a permanent and protective solution at less than one half the cost. The alternative provides treatment technology which reduces the mobility, toxicity and volume of the principal threat at the site.

CONSISTENCY WITH OTHER LAWS (ARARs)

One of the primary statutes that affects CERCLA activities is the Solid Waste Disposal Act (SWDA), particularly Section 1003(a), which emphasizes maximum protectiveness through safe hazardous waste management practices, implementation of permanent solutions, and minimization of both generation and land-based disposal of hazardous wastes. The combination of ground water treatment and off-site incineration of contaminated soils provides protection to human health and the environment through the use of established technologies. It also represents a permanent solution for the site by (1) removing the contaminants from the ground water by air stripping and carbon adsorption and (2) removing any residual source of continuing contamination from the site to a secured off-site facility for incineration. As a result, residual risk becomes negligible and long-term reliability is high.

The selected alternatives will provide a permanent remedy for the contamination at this site. The treatment levels to be reached are the maximum contaminant levels (MCLs) of the Safe Drinking Water Act (SDWA) and the New Jersey Environmental Cleanup Responsibility Act (ECRA) for ground water and soils, respectively.

During the implementation of the selected remedy, both emissions of volatile organics from the air stripping operation and volatile organics and particulates during excavation of the soils will have to be controlled. The design criteria to ensure that regulated air standards are not exceeded will be followed. These criteria are: NJAC: Title 7; Chapter 27, subchapter 8 (Permits), subchapter 13 (Ambient Air Quality Standards), subchapter 16 (Volatile Organic Substances), subchapter 17 (Toxic Volatile Substances); and the Resource Conservation and Recovery Act (RCRA).

ENFORCEMENT ACTIVITIES

To date, only two potentially responsible parties have been identified for the Williams Property site: The property owner and the generator of the hazardous substances. The property owner is not financially viable. Although, the

generator is, an agreement could not be reached with that party regarding the conduct of the RI/FS. Upon the signing of this ROD, EPA will issue a notice letter to the generator to bring it into negotiations regarding the remedial design/remedial action phase of this remedial action.

COMMUNITY RELATIONS ACTIVITIES

A Community Relations Plan for the Williams Property site was approved in July 1984. This document lists contacts and interested parties throughout government and the local community.

It also establishes communication pathways to ensure timely dissemination of pertinent information.

The RI/FS reports were sent to four local information repositories to initiate the public comment period, which extended from August 6, 1987 to September 9, 1987. A public meeting was held on August 18, 1987 to present the results of the RI/FS, along with the preferred alternative for the site, which was developed by EPA and NJDEP.

A summary of the comments raised concerning the RI/FS and the public meeting are contained in the attached responsiveness summary. The local community did not express strong positive or negative feelings for any of the remedial alternatives. Their main concerns were when the site would be cleaned up, and how long it would take.

SCHEDULE*

Activity	Date
- Public Meeting	August 18, 1987
- Regional Administrator Signs Record of Decision	September 25, 1987
- 60 Day Enforcement Moratorium **	September 1987 to November 1987
If no PRP Agreement, then:	
- EPA Funding of Remedial Design NJDEP Contractor Procurement Process for Remedial Design	January 1988
- Initiate Remedial Design	June 1989
- Reopen PRP Negotiations for remedial action implementation at Design Completion	July 1989
- Contractor Procurement Process for Construction	August 1989
- Initiate Remedy Implementation	October 1989
- Construction Complete	October 1990

*This is a projected schedule for this site and it is therefore subject to future modification.

**If a "good faith" offer by the PRPs is made within 60 days, the enforcement moratorium would be extended an additional 60 days.

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
RICHARD T. DEWLING, Ph.D., P.E., COMMISSIONER
CN 402
TRENTON, N.J. 08625
609 - 292 - 2885

18 SEP 1987

Mr. Christopher J. Daggett
Regional Administrator
USEPA - Region II
26 Federal Plaza
New York, N.Y. 10278

Dear Regional Administrator Daggett:

This is to formally notify the United States Environmental Protection Agency that the New Jersey Department of Environmental Protection has reviewed the draft Record of Decision for the Williams Property Site and concurs with the recommended remedy. This remedy will consist of the following:

- Extraction and treatment of contaminated ground water on-site using air stripping to remove volatile organics and carbon adsorption to remove remaining volatile organics and semi-volatile organics.

- Recharge of the treated ground water to the aquifer on-site.

- Excavation of the contaminated soils above the action level at the original spill area.

- Removal of the excavated soils to an approved off-site disposal facility for incineration.

- Regrade the site with clean fill, revegetate and restore the site.

New Jersey fully appreciates the importance of the Record of Decision in the cleanup process and will continue to take all reasonable steps to ensure that the State's commitments in this area are met.

Sincerely,

Michael L Catania for
Richard T. Dewling

100% Recycled

SEP 2 1 1987

WILLIAMS PROPERTY SITE
MIDDLE TOWNSHIP
CAPE MAY COUNTY, NEW JERSEY

RESPONSIVENESS SUMMARY

This community relations responsiveness summary is divided into the following sections:

Section I — Overview - This section discusses the New Jersey Department of Environmental Protection (DEP) and the United States Environmental Protection Agency's (EPA) preferred alternative for remedial actions, and likely public reaction to this alternative.

Section II — Background on Community Involvement and Concerns - This section provides a brief history of community interest and concerns raised during remedial planning activities at the Williams Property site.

Section III — Summary of Major Comments Received during the Public Comment Period and the DEP/EPA Responses to the Comments - Both written and oral comments are categorized by topics as are the DEP/EPA responses.

Section IV — Remaining Concerns - This section describes remaining community concerns about which DEP/EPA should be aware in conducting the remedial design and remedial action at the Williams Property site.

In addition to the above sections, attachment A (included as part of this responsiveness summary) identifies the community relations activities conducted by DEP and EPA during remedial response activities at the Williams Property site. Attachment B was written as a direct response to one of the questions which was asked at the August 18, 1987 public meeting.

Section I — Overview - The final alternative specified in the Record of Decision (ROD) is a combination of Ground Water Alternative 3 (extraction, air-stripping, carbon adsorption and recharge) and Soil Alternative 4 (excavation of soils, off-site incineration, surface grading and revegetation).

Although the residents asked numerous questions at the August 18, 1987 public meeting, and although they are concerned about the continued dumping and the building moratorium, there was virtually no criticism of the chosen alternatives.

Section II — Background on Community Involvement and Concerns - The county and municipal governments have played significant roles in trying to resolve the past and current problems at the Williams site. In order to protect public health until the Remedial Investigation/Feasibility Study (RI/FS) would define the area of contamination precisely, a building

moratorium was established April 1, 1984 for the area within a one mile radius around the site. This was accomplished by not allowing well permits to be granted. The Cape May County Health Department made conscientious efforts to maintain a local community relations program, in the hopes of hastening the cleanup process.

The DEP has an active community relations program at Superfund sites, including the Williams Property. A public meeting was held December 9, 1985 at the start of the RI/FS. Approximately fifty people signed the sign-in sheet. On June 6, 1984 there was a DEP briefing with local and county officials about the land-use restrictions. The town hosted a special meeting on September 10, 1985 to discuss problems at the Williams site. These were in addition to the August 18, 1987 public meeting on the remedial alternatives.

III. Summary of Major Comments and Responses

Site History Questions

What happened to the drums that were originally removed by the (DEP)?

Response: Contaminated soil and drum carcasses were transported to the Browning Ferris Industries Landfill, Glen Burnie, Maryland. This facility is permitted by the state of Maryland to treat, store and dispose of hazardous waste.

What was the cost of the RI/FS?

Response: The total cost of the study through August, 1987 is $540,000 but that does not include the cost of the emergency removal action which was conducted in 1980.

Were the drums taken to MarTee Landfill or other sanitary landfills in the county (Cape May County)?

Response: Hazardous wastes from the site were not disposed of at sanitary landfills. As previously mentioned, wastes were disposed of at the Browning-Ferris Industries Landfill in Glen Burnie, Maryland.

One of your slides indicated that the contamination of residential wells observed in 1979 is not likely to have been caused by the documented spill. What did cause the contamination?

Response: Local potable wells sampled in 1979 indicated that low level organic contamination was present at some locations. Given the rate of groundwater flow determined by the RI/FS and the distances to the contaminated potable wells, it is not possible that the 1979 Williams Property spill was the source. Approximately 100 potable well samples have been taken between 1979 and the end of the RI/FS. Since the initial sampling, concentrations in almost all potable wells have decreased to non-detectable levels.

As part of the Remedial Investigation, a hazardous substance inventory map was compiled for the area surrounding the Williams spill site. The inventory located numerous possible sources of contamination surrounding the site in addition to adjacent local sand roads. It is postulated that the potable well contamination in 1979 was due to local dumping which predates the Williams Property spill.

What sort of industrial uses produce the type of pollutants that were found on the site?

Response: The basic contaminants identified as being present in the ground water are tetrachloroethylene, trichloroethylene, 1,1,1 trichloroethane and xylenes. All are commonly used in so many industries that it is difficult to pinpoint one industry as the source. Xylene is a common component of gasoline. Some of these chemicals are in ordinary household cleansers, detergents, spot removers, degreasers, resins, paints and septic tank cleaners. There are many possible sources for these waste chemicals.

Have you ever tested for dioxins in the soil at the site?

Response: Yes. We have taken and analyzed four samples, each of which turned out to have non-detectable levels.

Under the health assessment, did you ever look into causes of death in the immediate area?

Response: We developed toxicity profiles on the chemicals which we did find and looked at exposure routes - inhalation, ingestion and skin absorption, both for children and adults. We calculated what increases in cancer might be expected from these exposures. These statistics are in Section 3 of the RI/FS.

We have not initiated an epidemiological study because the population has really not been exposed to the contaminated ground water. The potable well sampling has indicated that the wells had not been contaminated by the Williams' spill. Local residents had not been exposed to the contaminated drinking water prior to the municipal water connection. Mr. Williams' contaminated well has been locked by the county health department as ordered by the court in 1984. The Public Health Assessment has indicated that residual contaminated soil presents an insignificant direct public health risk.

Ground Water Plume Questions

How large is the plume? How fast has it moved and in what direction?

Response: We installed 15 monitoring wells - shallow wells approximately 20 feet deep, intermediate wells about 60 feet deep, and deeper wells to 120 feet. We also sampled 8 residential wells both close to the site and as far away as 2,600 feet. The width of the plume is less than 300 feet. The minimum distance of the plume from the contaminated soil is 800 feet, and the maximum distance is 1,400 feet. It is flowing in a northeasterly direction. We believe the

55

plume is shaped like an elongated balloon.

How deep is the plume and at what rate is it going down into the ground? Does it go down into sandy soil? Does it sink?

Response: The first aquifer, the Holly Beach aquifer, has a maximum depth of 60 feet. It begins about 10 feet below the ground surface. At about 40 feet there is a some clay or silty sand and then there is 20 to 40 feet of sand. The upper two layers of sand are contaminated. If you go down 80 or 100 feet, there's a clay layer. Our evidence shows that this clay layer has not been penetrated by contaminants. We believe the plume has traveled downward 60 to 80 feet. Since trichloroethylene, tetrachloroethylene and 1,1,1 trichloroethane are heavier than water, they can sink right through the water column. Contamination has been detected throughout the surface aquifer within the plume.

Do you have a list of the known contaminants that have been found in that area?

Response: Refer to the Tables in the RI and the FS.

How many gallons of water have to be removed from the area and how long will it take?

Response: Once the wells are installed, they will be pumping approximately 10 to a 100 gallons a minute. This will mean hundreds of thousands of gallons, maybe millions. While the pumping is maintained, the plume migration will be controlled and the plume size will not expand. We will keep treating the water until it meets all relevant standards. This could take four or five years.

Are you going into the ground water or into the aquifer?

Response: Ground water locally consists of a number of aquifers.

How deep will the wells be?

Response: There may be one well or a series of wells, depending on the results of the design stage. They will be designed to correct the contamination in the 60 to 80 foot zone.

Concerns about soil contamination

You said it would take two months to excavate the soil. How many yards of material are you going to excavate? Why does it take two months?

Response: The design phase will determine the extent of excavation which will be required. Current estimates of the volume to be excavated range from 700 to 4,000 cubic yards. Excavation of contaminated soils requires careful planning and handling at all stages. Soil must be excavated, classified and then transported to a suitable treatment site. Workers on the scene must be protected throughout all of this. Protective gear is cumbersome.

You said you would be going down through the sand again. Is this going to be 10 or 60 feet under the clay or is it 10 to 60 feet from the ground?

Response: From the ground level, it's about 10 feet until you encounter ground water. Another 30 feet below there's a silty or clay layer which varies in thickness from almost absent to a few feet thick. Then there's another 40 feet of sand underlain by a 15-35 foot clay layer. What is contaminated is from 10 feet below the surface down to the underlying clay at approximately 80 feet.

How long is it going to take before the contaminants penetrate the clay?

Response: The clay will not absorb the ground water. Permeability through the clay is extremely slow. Organics have an affinity for clay material and they will tend to absorb to the clay, thereby further reducing risk.

On soil remedial alternative number two, it says a landfill will be constructed on-site for the excavated contaminated soil. Would it also accept contaminated soil from other locations in the state?

Response: This alternative has been rejected because of cost, infeasibility and technology, but it was an alternative which had to be considered initially.

What happens to the soil after it is incinerated?

Response: The remaining incinerated soil (ash) would be deposited at a chemical landfill which is permitted to accept hazardous materials.

You said there was metal contamination in the soil.

Response: The metals in the soil are well below the DEP action levels and, in fact, are below New Jersey background levels in some cases.

Questions about air stripping

Would you please explain what air stripping is and if it would create air pollution?

Response: Air stripping is a process in which a column is brought onto a site or built there. The water goes up to the top of the column and is allowed to trickle down through the column, which is packed with material similar to ping-pong balls with large surface areas. As the water trickles down, air is pumped upwards and the volatile organics are driven off. Air stripped contaminants can be captured via carbon adsorption at the end of the volatilization chamber. The applicable air emission standards would be applied and used as a basis to determine the necessity of and the extent of carbon adsorption required. We will perform air monitoring to make sure this is protective of air quality around the site. Calculations in Appendix C of the FS indicate the volatile gas emissions will be well under permissible levels even if the worst ground water conditions occurred.

What happens to the carbon filters? How many layers thick is the carbon?

Response: The filters are processed and regenerated through heating. The engineering design stage will determine how much carbon will actually be necessary to purify the water.

Procedural Questions and Future Actions

What number are we on the cleanup list and why has it taken eight years to get this far?

Response: The Williams Property is ranked number 59 of the 100 National Priorities List sites located in New Jersey. Although the dumping occurred in 1979 and the removal took place in 1980, the study of the remaining contamination began in April of 1986. It is now August, 1987 so this was only 16 months. The Superfund legislation created an entirely new program. Procedures needed to be established, an organization had to be created, guidelines had to be determined, etc. In addition, the remedies to be considered at each site are often on the cutting edge of technology.

Now we are past the most difficult part. When the Superfund amendments were passed in October, 1986, there was an additional emphasis on providing permanent remedial solutions, which take more time than temporary ones.

What would happen if you didn't do anything? You didn't do anything in eight years and nobody died. I think the contamination is dissipating.

Response: Yes, but that's the problem now. The contamination is spreading. The soil remains a source of future ground water pollution. Everytime it rains, the rain water filters down through the soil and carries additional contamination into the ground water. We are required to consider the possibility of doing nothing, but in this case, we rejected that alternative because it is not protective of human health or the environment.

Congressman Hughes has played a part in moving this project. Has his office been provided with all these documents so he might review them?

Response: Congressman Hughes was mailed a copy of the Agenda and Proposed Remedial Action Plan on August 24, 1987.

One of the concerns I have is about the lakes back there and the gravel pits. Have they been tested? Has the wildlife been tested for contamination? Are the fish safe to eat? Are the kids safe swimming in the gravel pits?

Response: When the sampling crew went out, the gravel pits were dry so sampling could not be done.

Surface water feeds these pits. Since the water flows to the northeast of the Williams property and since two of the pits are to the southwest of the site, the pits west of Siegtown Road should not be contaminated

by this spill. The pit to the east of Siegtown Road is further away than the potable wells which were sampled. These wells had non-detectable levels of contamination.

What security arrangements will be made to protect the monitoring wells and air stripping unit?

Response: Although the details will be worked out during the design stage, we can say that usually the piping is underground and the treatment works are either enclosed in a building or surrounded by fencing.

I seem to get the feeling from you that we're talking about another plume of contamination emanating from the dump. When you find a problem and there are indications that it could have spread to a new area, is that referred to as a further investigation or enforcement issue or do you just zoom in on one issue? If there could have been another source, will you check it out?

Response: After determining the extent and type of contamination, immediate hazards are addressed. Sources of contamination are investigated as part of governmental activity in such cases.

Has it ever been the case that your decision on remedial action has been changed by comments from the public?

Response: Yes. (See attached correspondence, Item B).

Do you know what the total cost of the cleanup will be?

Response: We estimate that it will be in the neighborhood of $1,000,000 to $2,000,000 over and above the cost of the RI/FS.

How many years will the cleanup take?

Response: It will take until the end of September 1987 to make the final decision about which alternative is the best. Then it takes 12 to 18 months to do the engineering design after which bids are solicited with a construction firm to do the site work. The soil removal would take two or three months and the ground water cleanup might take four or five years.

IV. Remaining Concerns

Concerns About Future Dumping

The township was advised in April that the DEP enforcement officials were coming down to investigate reports of crank case oil and automatic transmission oil still being dumped at the site. What is the status of these reports and what is the result of the investigation? Who made the physical inspection?

Response: The investigation is not complete. The Enforcement Element of the DEP and the Cape May County Health Department are conducting inspections with input from DEP's Division of Hazardous Site

Mitigation and Division of Solid Waste Management. See Attachment C for Cape May County's progress. Follow-up inspections and actions will be forthcoming.

I think the continued dumping is an immediate problem and all of the work that you have done thusfar could be jeopardized by the fact that Mr. Williams may be putting more contaminants into the ground.

Response: We agree, action must be taken to prevent reoccurrence of the dumping.

Who is legally responsible for the dumping?

Response: As the remediation of the site is ongoing and is being financed with public funds, the question of liability is one that arises in two contexts - the allegations concerning continued dumping at the site and the recovery of the public funds expended during the cleanup.

As to the former, DEP will undertake an investigation to determine if there is in fact dumping presently occurring at the site. As to the identity of the persons who might ultimately be liable in a cost recovery action seeking a return of governmentally expended funds, that determination cannot be made until such an action is taken. It is not DEP or EPA's policy to prematurely reveal the identity of parties who may be legally responsible for the release of hazardous substances until either agency has gathered sufficient evidence and initiated enforcement action.

Moratorium

The taxpayers carry the burden of this one mile radius moratorium. Can't you make the recommendation to reduce the size of the area? How long will it take?

Response: The DEP did not set up the moratorium, although it is certainly one way to prevent new wells from being drilled into a contaminated aquifer and thereby exposing new residents to hazardous substances. Our Division of Water Resources is working on this problem and their report should be ready in another month. (10/87)

Presently the DEP is awaiting information from the township engineer, the county planning board or the county health department regarding the actual number of wells in the area. Once that information is obtained, a well restriction form is filed with the Bureau of Water Allocation within the DEP.

Item B

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS SITE MITIGATION
401 E. State St., CN 413, Trenton, N.J. 08625
(609) 984-2902

Anthony J. Farro
Director

SEP 15 1987

Ms. Mary Ann Gay
P.O. Box 531
Green Creek, NJ 08219

Dear Mary Ann:

The question you raised at the Williams Property public meeting about whether public input has ever affected the agencies' decisions on a site cleanup was an important one. In response, I will give you the information I have been able to gather from New Jersey's experience, as well as nationally.

Krysowaty Farm (site #15 on the attached New Jersey National Priorities List) was mentioned to you as an example of a site at which the citizens' response made a difference in the remedial decision. In that case, the United States Environmental Protection Agency (EPA) intended to choose the "No Action" alternative, although the local health department wanted to have new water lines installed. Because of citizen input, new water lines were installed.

In the case of Lipari Landfill (site #1, the NPL), the original plan to flush and treat the contamination was modified as a result of citizens' concern.

In the case of Brick Township Landfill (site #12) a citizen related where he had been required to dump hazardous materials in the course of a job he had had as a teenager, thus helping the investigation.

Many local public officials and residents are involved early in the cleanup process and there is a required public meeting at the beginning of each Remedial Investigational/Feasibility Study (RI/FS) to allow for early citizen involvement and direct input to the study. In the case of Florence Land Recontouring Landfill, Inc. (site #39), citizens' input during the very initial stages helped to determine the location of a number of potable well sampling points.

As you can see by the enclosed newspaper articles, the Ocean County Citizens for Clean Water group was responsible for the current plans to do further testing at Ciba-Geigy in Toms River (site #25, Toms River Chemical).

It may be helpful for your understanding of the situation to know that the Superfund cleanup program is relatively new and complex, and often on the cutting edge of technology. Even so, there have been 27 Records of Decision (ROD) completed through 1986 in New Jersey and five are pending this year, for a total of 32.

Although the process is thorough, tedious and time-consuming for us all, there is one favorable aspect. By the time the RI/FS is completed, our contractors and Department Personnel usually evaluate any reasonable solution to the problem. Hundreds of thousands of dollars and many staff hours go into each report, both by government agencies and their contractors, so there are not often brand new solutions which emerge during the public period prior to the final decision.

Citizens' comments are always welcomed. We have an obligation to consider all such comments, some of which are very valuable in our efforts on behalf of the residents of New Jersey in addressing environmental problems.

In order to answer your question more thoroughly and from a broader base of information, we have been in touch with USEPA headquarters in Washington, D.C. They have sent the enclosed "Community Involvement" article for you.

Also enclosed is a booklet on "New Jersey's Hazardous Waste Management Program," a summary of DEP's Community Relations Program at Superfund sites, and an EPA publication about "Public Involvement in the Superfund Program".

Thank you for your patience in awaiting this reply to your question. If you would like further information, please let me know and I will try to help you. My phone number is (609) 633-2320

Sincerely,

Susan Topf

Susan Topf
Bureau of Community Relations

HS249:fb

attachment

c: G. Singer, Chief, BCR, NJDEP
M. Shapiro, National Community Relations Coordinator, USEPA

Attachment A

COMMUNITY RELATIONS PLAN

FOR HAZARDOUS WASTE SITE REMEDIAL ACTION

WILLIAMS PROPERTY

MIDDLE TOWNSHIP

CAPE MAY COUNTY

JULY 1984

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

HAZARDOUS SITE MITIGATION ADMINISTRATION

PREFACE

This Community Relations Plan is primarily an internal working document which serves as a guide to communication with the affected community. The activities and schedules in the Plan may be altered according to future prevailing circumstances.

COMMUNITY RELATIONS PLAN
FOR REMEDIAL ACTION AT THE WILLIAMS PROPERTY SITE
MIDDLE TOWNSHIP, CAPE MAY COUNTY
JULY 1984

Introduction

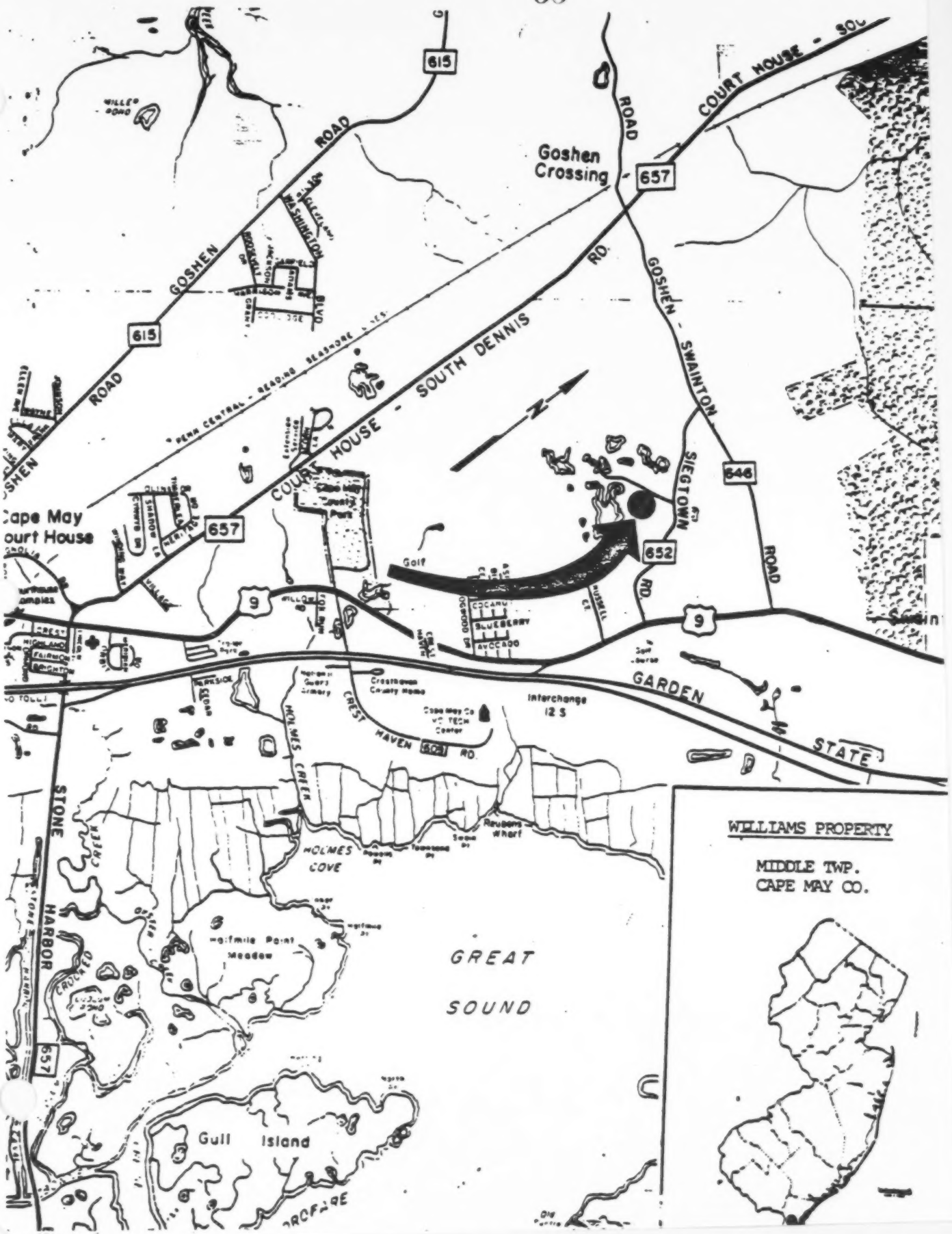
This Community Relations Plan outlines activities to be conducted during Superfund hazardous waste remedial action at the Williams Property site in Cape May County. The plan is designed to inform public officials and citizens, as well as to receive input from them on the remedial action. The plan may be updated periodically to reflect project activities and public involvement. The plan schedule is based on the project status as of May, 1984. The Williams Property site was included on the proposed National Priorities List issued by the United States Environmental Protection Agency (USEPA) on December 20, 1982. Of 85 New Jersey sites on the National Priorities List, this site is ranked 53rd in priority.

A. Background and Key Issues

1. Background

The Williams Property is an inactive site situated less than 600 feet south of Siegtown Road and approximately one-half mile west of Route 9 in Swainton, Middle Township. This 5.6 acre tract is found in a mixed residential/agricultural area of the southernmost municipalities of the Pinelands National Reserve. Not more than three miles to the northwest lies the Timber Beaver Swamp Fish and Wildlife Management Area, a major aquifer recharge zone, while on either side of the site are sections of prime wetlands habitat. Soil composition on site is of highly permeable coarse-to-fine-grained sand, with varying amounts of fine gravel, overlying the Holly Beach Aquifer. This, in turn, overlies the larger Cohansey Aquifer, separated from the Holly Beach Aquifer by semi-pervious estuarine clay. The nearest surface water sources are standing waters in surrounding gravel pits roughly 700 feet away; Deep Creek is approximately 3,100 feet from the site. Found within a three-mile radius are three nursing homes, two schools, the County Vo-Tech Center, the County Office Complex and jail, a County Park, and local campgrounds. There are 170 people living within 100 feet of the site, mostly along Siegtown Road, while the total permanent population within three miles is 3,488. This number is estimated to increase seasonally (primarily with campers) to 12,803. There is also a daily influx of about 2,000 outside residents to the County Courthouse in Cresthaven.

The site itself is bounded by Siegtown Road to the northeast and accessible by a dirt road. The property has both wooded and open areas with the principle source of contamination localized in a clearing just south of the house. There are several abandoned vehicles and refuse piles strewn throughout the property. Ownership is listed to a Mr. Gerald Davis who is presently serving in the Armed Forces overseas. Mr. Theodore Williams, brother-in-law of the owner, currently resides on the property.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Island
WILLIAMS PROPERTY
MIDDLE TWP.
CAPE MAY CO.

During 1978-1979, Mr. Williams had given verbal permission to Mr. Francis Block to store 200-300 55-gallon drums of unknown liquids and solids on the property. When Mr. Williams was ordered by the Cape May County Department of Health to remove the drums, he reportedly attempted to contact Mr. Block to arrange for removal. After several fruitless endeavors, Mr. Williams took it upon himself to try to dispose of the barrels at a local landfill; however, the landfill would not accept full drums. Mr. Williams returned home and punctured the drums allowing their contents to spill and drain into the soil. There is also evidence to suggest that there may have been tank-trailer discharges at the site.

In January of 1980, eleven monitoring wells were installed and sampled under the direction of the New Jersey Department of Environmental Protection (NJDEP). In June, NJDEP supervised the removal and proper disposal of 1160 cubic yards of contaminated soil above the ground water table. Removal of the soil and remaining drums, some of which were full, was financed under the N.J. Spill Compensation Fund (there is a possibility that some contaminated soil remains on site). Groundwater sample analyses indicated contamination by pesticides, heavy metals, and various organic and inorganic compounds. In the past, there has been evidence of stressed vegetation.

An expanding groundwater plume with lateral dimensions of about 1000 feet by 300 feet is thought to be flowing northeast of the site at a rate slightly below one foot per day. NJDEP plans to install three to four monitoring wells at the site in late August or early September 1984 in an attempt to track the path of the plume before it reaches proximate residential wells. Eight potable wells in the immediate site vicinity are currently being tested for priority pollutants on a quarterly schedule by NJDEP. Mr. Williams has been advised not to use his well and the Cape May County Department of Health is, at present, supplying him with bottled water.

revise

At this time, all responsible parties are being investigated by NJDEP and compensation will be sought for any work done. A Cooperative Agreement was initiated between NJDEP and the United States Environmental Protection Agency (USEPA) in May 1984 and has been approved by USEPA.

2. Key Issues

The Holly Beach Aquifer supplies approximately 60 percent of Cape May County residents with potable water. This aquifer is important for irrigation purposes and fire control as well. Extensive development has been planned for the region and the purity of this

reserve is paramount to the plan. There is also a potential threat of chemical migration into the Cohansey Aquifer, a 17-trillion gallon groundwater source serving most of southern New Jersey.

In April 1984, the Cape May County Board of Freeholders instructed the County Planning Board and Department of Health to prevent all development within a one-mile radius of the site. This will remain in effect until cleanup is completed, or at least until the precise dimensions of contamination are defined (as indicated in the feasibility study to commence in the fourth quarter of 1984). Δ

The region is utilized extensively for recreation, and seasonal traffic on area roads can be quite heavy. Some of the water filled gravel pits are used for swimming and fishing, and there had been tentative plans made for the construction of a recreational facility. Furthermore, there are several endangered species found in the surrounding habitats.

3. History of Community Involvement

The contamination of the Williams Property has garnered quite a bit of attention from the media, local government, and citizenry. The story has been reported and kept up-to-date, although sometimes inaccurately, in all the major newspapers in New Jersey. Further coverage has come from the three major television stations in Philadelphia. This media attention may have generated additional community interest in the problems encountered in a site cleanup. There are no known organized community or public interest groups involved to date, however, a few individual citizens have expressed concern through letters or phone calls to government officials and the media. At one point, a local minister had planned to initiate a petition calling for the removal of some of the barrels thought to be taken to a local landfill.

The county and municipal governments have played significant roles in attempting to resolve the problem to their satisfaction. The Cape May County Department of Health and the Planning Board have been in constant touch with NJDEP requesting current information and urging an expeditious cleanup of the site. They have suggested procedures to the State that they felt might facilitate the process. One internal County Department of Health recommendation was to allow the County to conduct all community relations activities in order that State funds be released for actual cleanup. Regardless of who administered them, the Department of Health requested an early initiation of these activities.

On October 6, 1983, the Middle Township Committee adopted a resolution which charged that NJDEP had "failed to adequately monitor" potable water in the vicinity of the site and demanded that the State begin such a program. The resolution went on to urge NJDEP to take immediate steps towards cleanup.

Former State Senator James Cafiero and United States Congressman William J. Hughes have both exhibited a keen interest in the ongoing status of the Williams Property.

B. Objectives of the Community Relations Program:

1. Ensure that local officials and interested citizens are kept abreast of plans and site developments.
2. Ensure the participation of local officials in all appropriate community relations activities and establish means of obtaining input from affected citizens and community leaders on remedial alternatives under consideration.
3. Provide local press with accurate information about important proposed actions.
4. Provide feedback to participants.

C. Community Relations Techniques To Be Used

Technique	Objective
1. Telephone Calls	-- to maintain lines of communication with local and other officials as well as involved citizens.
2. Briefings	-- to inform officials, residents and other interested parties about the nature of the planned remedial action, and to provide them with background material on the technical studies when requested.
3. Press Releases	-- to provide accurate information to local press and interested citizens (through the NJDEP Press Office).
4. Public Meetings	-- to inform citizens of planned or ongoing activities and to discuss and receive citizen feedback on possible courses of action.
5. Fact Sheets	-- to be distributed at meetings or in response to local press or citizen inquiries to ensure public understanding of basic issues involved in the remedial program.
6. Responsiveness Summary	-- to provide a final summary of citizen concerns and problem areas, and the governmental response to them.

D. Proposed Work Plan and Estimated Schedule (Calendar Year)

Time (Initiation of Action)	Activities	Staff Responsibilities
Remedial Investigation/ Feasibility Study		
4th quarter of 1984 (Investigation and report expected to take 18 months for completion)	2 Public Meetings--one at initiation of study, one at completion of study to present alternatives	*
	2 Fact Sheets--one at initiation of study, one to describe alternative remedial actions	**
	3 Press Releases (or as necessary)--two to advertise public meetings, one to announce engineering designer	***
	1 Reponse Summary conducted in cooperation with contractor after public discussion of alternatives and 30 day comment period	**
Engineering Design		
2nd quarter of 1986	1 Public Meeting	*
	1 Press Release to advertise public meeting	***
	1 Fact Sheet	**

Proposed Work Plan and Estimated Scheduled Continued

Removal/Treatment/Construction	2 Public Meetings (one at initiation of remedial action, one at completion)	*
	2 Press Releases to advertise public meetings	***
	2 Fact Sheets	**
Post Closure/Summary of Activities	1 Response Summary	**
	1 Media Appearance, as necessary	*
Travel	Approximately 6 trips to site location, with additional trips scheduled as necessary to meet community requirements	*

* NJDEP/HSMA+ Community Relations Representative(s)
NJDEP/HSMA Bureau of Site Management Representative(s)
NJDEP/HSMA Bureau of Environmental Evaluation and Risk Assessment Representative(s) (as necessary)
NJDEP/HSMA Administrator (as necessary)
NJDEP legal or other staff (as necessary)
USEPA Representative(s) (as necessary)
Project Contractor, (when requested)

** NJDEP/HSMA Community Relations Staff

*** NJDEP/HSMA Community Relations Staff, through NJDEP Public Information Office

+Hazardous Site Mitigation Administration

Note: Staff work hours could not be estimated at this time.

E. Contacts

Federal Officials

Senator Bill Bradley (202) 224-3224
Senate Office Building
Washington, D.C. 20510

District Office: (202) 349-3133
917 North Main Street
Toms River, N.J. 08753

Senator Frank Lautenberg (202) 224-4744
Senate Office Building
Washington, D.C. 20510

District Office: (609) 757-5353
Parkade Building
518 Market Street
Camden, N.J. 08101

Representative William J. Hughes (District 2) (202) 225-6572
House Office Building
Washington, D.C. 20515

District Office: (609) 645-7957
2307 New Road
Northfield, N.J. 08225

State Officials (District 1)

Senator James R. Hurley (609) 327-0030
P.O. Box 809
821 Columbia Ave.
Millville, N.J. 08332

Assemblyman Joseph W. Chinnici (609) 451-2276
P.O. Box 926
c/o Major Coat Co.
Bridgeton Ave.
Bridgeton, N.J. 08302

Assemblyman Guy F. Muziani (609) 729-3786
Professional Plaza
6 Anglesea Dr
North Wildwood, N.J. 08260

County Officials

Gerald Thorn
~~Anthony T. Catanoso~~, Director (609) 465-7111
Board of Chosen Freeholders ext. 229
County of Cape May
Cape May Court House, N.J. 08210

Cape May County Department of Health
Crest Haven Complex
Garden State Parkway & Crest Haven Road
Cape May Court House, N.J. 08210
Gerald M. Thornton, Freeholder (609) 465-3181
Louis J. Lamanna, MA, Director ext. 260
Raymond Chadwick, Environmental Program Adm.
Clay C. Sutton, Principal Planner Environmental

Cape May County Planning Board
13-34 Mechanic Street
Cape May Court House, N.J. 08210
William E. Sturm, Jr., Freeholder (609) 465-7111
Elwood R. Jarmer, Director ext. 278
William J. Diller, Jr., Chairman

Supervising Principal Planners:
David Rutherford
Edward R. Filipski

Members:
William Laskey, Vice-Chairman
Neil Clarke, Secretary
Madelyn Calloway
John MacLeod
Frederick A. Long, Jr.
Anthony T. Catanoso
James S. Kilpatrick, Jr.
Rose Johnson
Ellwood Shephard, Alternate Member

Cape May County Public Works (609) 465-7111
Neil O. Clarke, County Engineer ext. 301
14-34 Mechanic Street
Cape May Court House, N.J. 08210

Environmental Council (609) 399-6232
Jeanne Clunn, Chairman
P.O. Box 315
Ocean City, N.J. 08226

Environmental Council (609) 398-3280
Jeanne Gorman, Secretary
324 Central Ave.
Ocean City, N.J.

Members:
Alice McGuinn, Vice-Chairman
Larry Newbold
Helen Sciarra
Ruth Hart
Stephen Patrick

Emergency Management (609) 465-9408
Louis A. Rodia Jr., Public Information
14-34 Mechanic Street
Cape May Court House, N.J. 08210

Local Officials

Middle Township

Michael J. Voll, Mayor (609) 465-5107
George H. Simpkins, Clerk -5108
33 Mechanic Street
Cape May Court House, N.J. 08210

Township Committee:
James E. Alexis
Charles M. Lausner

Alvin C. Herman, Engineer (609) 465-2559
7 Mechanic Street
Cape May Court House, N.J. 08210

Bruce M. Gorman, Attorney (609) 729-3243
Rt. 9 & Vermont Ave.
Rio Grande, N.J. 08242

Individual Concerned Citizens

James Cafiero (609) 522-0511
3303 New Jersey Avenue
Wildwood, N.J. 08260

John Alfred Bishop unpublished
189 Siegtown Road
Swainton

Rev. G. Kenneth Carpenter no listing
Shore Road returned
Cape May Court House, N.J. 08210

Elizabeth G. Davis (609) 465-7524
RD #1
P.O. Box 191A
Cape May Court House, N.J. 08210

Dorothy Kane no listing
RD #1
P.O. Box 191
Siegtown Road
Cape May Courthouse, N.J. 08210

Mr. & Mrs. R.L. Lewis unpublished
2 New Vernon Ave.
Ocean View, N.J. 08230

Adele Thompson
Siegtown Rd.
Swainton, N.J.

unpublished

Theodore Williams
P.O. Box 188
Siegtown Road
Swainton, N.J.

no listing

Citizens' Assoc. for Protection
of the Environment
Ruth Fisher
P.O. Box 33
Cape May Court House, N.J. 08210

no listing

(See attached list for commercial and residential properties located within a one-half mile radius of the site.)

N.J. Department of Environmental Protection

Julian Antebi, Site Manager, HSMA	(609) 984-3253
Grace Singer, Community Relations Program Manager, HSMA	(609) 984-3081
~~Steve Johnson, Site Management Team, DWR~~	(609) 292-0668
~~William Lowry, Site Management Team, HSMA~~	(609) 984-4843
Rich Ericson, Site Management Team, ORS	(609) 292-1143

U.S. Environmental Protection Agency Michael Zachewich, EPA?

Robert McKnight, Project Manager	(212) 264-8679
Lillian Johnson, Community Relations Coordinator	(212) 264-2515

Press Contacts

Atlantic City Press
6 S. Main St.
Cape May Court House, N.J. 08210
Robert Ebener, Editor

(609) 465-5031

Gazette-Leader
1212 Atlantic Ave.
North Wildwood, N.J.
Barbara St. Clair, Editor

(609) 522-3423

Cape May Star & Wave
513 Washington Street Mall
Cape May, N.J.
O.L. Flood, Editor

(609) 884-3465

Cape May County Herald (609) 465-5055
28th & Dune Drive
Avalon, N.J.
Joe Zelnik, Editor 05202

Lower Township Lantern (609) 465-5055
1300 Bayshore Road
Villas, N.J.
Joe Zelnik, Editor 05251

Ocean City Sentinel-Ledger 05225 (609) 399-5411
112 E. 8th Street
Ocean City, N.J.
Charles M. Thompson, Jr., Editor

Township Times (609) 390-3000
44 Tuckahoe Rd.
Marmora, N.J. 05223
Tom Watkins, Editor